The Chemical Age

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Contents

	PAGE
Editorial Notes: Industrial Organisation; the Permeability of Rubber to Gases; Chemical Engineering Courses; Restricted Dyestuff Imports; the Storage Tank Danger; Pulp and Paper	389
The Calendar	391
Structure Symbols of Organic Compounds and Radicals. By INGO W. D. HACKH	392
Review	394
Profiteering in Soda	395
Restricted Imports of Synthetic Dyestuffs	396
Industrial Conditions in Chemical Factories	397
The Molecule in Crystalline Solids	398
Carriage of Chemicals: Grievances of Manufacturer and Trader	399
Institution of British Foundrymen	399
Malleable Cast Iron Research Association	400
Fuel Problem in Germany: Brown-Coal Distillation	400
From Week to Week	401
References to Current Literature...	402
Patent Literature	403
Monthly Market Report and Current Prices	406
Commercial Intelligence	408

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Industrial Organisation

No one at all seriously interested in the organisation of industry can well afford to ignore the report for the past year of the Chief Inspector of Factories & Workshops (Cmd. 941, 1s. 6d.). The first year after the cessation of hostilities, as Mr. R. E. Graves points out, has been a very notable one for industry, and the reports covering this period are of exceptional interest. It is remarkable how complete has been the change over from war to civil production, and with what smoothness on the whole the transition has been accomplished. The first great step in the transformation was the gradual, but now almost complete, withdrawal of women from the men's industries and the absorption into industry of the demobilized men. The next was the resumption of the manufacture of the ordinary articles of commerce. In many trades the manufacturers had little difficulty because the articles made were much the same either for war or for peace purposes, but in many others which had been equipped specially for the manufacture of war material new work had to be found and machinery and plant adapted.

The detailed reports refer to the unprecedented demand for commodities of all sorts, and manufacturers are reported to have booked enough orders to keep them fully occupied for a long time to come. To meet this great pressure they have been reaching out in all directions with a view to expansion, and the demand for buildings and plant of all sorts has greatly outrun the supply. In order to meet the ever-increasing cost of production and the scarcity of labour and to speed up production, there appears to have been, all over the country, a very general conversion of workshops into factories by the introduction of mechanical power, and electrical installations have been numerous. Among the trades in which developments are specially mentioned are the glass industry, which has developed enormously during the war, especially in the manufacture of optical and chemical glassware, and the manufacture of synthetic dyes and fine chemicals, including increased output of phenacetin, aspirin, and saccharine, while in the North-Western division the position of the dyers and calico printers, who were hard hit for want of dyes during the war, is reported to have been "relieved to an extent which could not have been anticipated by the enterprise of firms in our rejuvenated dye-making industry." We are not sure whether the official contentment which the last statement indicates is entirely shared by British dyestuff users, or that "rejuvenated" is quite the right term to use in this connection. Amalgamations and co-operative arrangements between firms with a view to increased and cheapened production are freely reported from all districts and standardization and specialization are described as being "the order of the day."

Not the least interesting aspect of the report is the prominence it gives to the human side of industry, and especially to welfare schemes.

The Permeability of Rubber to Gases.

THE Department of Commerce of Washington has just issued a report (Paper No. 387) giving details of an extended investigation which has been conducted by Messrs. J. D. Edwards and S. F. Pickering into the factors governing the permeability of rubber to a number of the more common gases and vapours. The paper is of considerable importance in that rubber in one form or another is in everyday use on scales varying from the smaller demands of the laboratory to the considerable demands of lighter-than-air craft. Some 50 years ago it was pointed out that the passage of gas through rubber takes place by solution in the rubber and not by diffusion through microscopic openings. Since then it has been recognized that certainly some phenomenon other than that of diffusion through small apertures is concerned, and that the rate of penetration is dependent upon the nature of both the rubber and the gas. Permeability, or the rate of penetration, is usually expressed in terms of litres of gas passed per square metre per 24 hours, the gas volume being corrected to 0°C. and 760 mm. Owing to the common use of hydrogen for aeronautical purposes and to the accuracy with which the

permeability of this gas may be determined, the permeability of other gases is based upon that of hydrogen as the standard of comparison.

Briefly, the Washington research has endeavoured to determine permeability in relation to the composition of the rubber, in relation to pressure and temperature, and in relation to the thickness of the rubber. These considerations have been studied in connection with a number of the commoner gases such as hydrogen, oxygen, nitrogen, and carbon dioxide. As regards the theory of permeability, the investigators say that a simple and satisfactory picture of the process is one of dynamic equilibrium, in which the gas is dissolved at one side of the rubber at a rate proportional to its solubility and partial pressure, and diffuses through the rubber where it evaporates from the other side. The same process takes place in the opposite direction, so that the net transference of gas is proportional to the difference in the partial pressures at the two faces of the rubber. The permeability in every case investigated increases rapidly with increase of temperature.

A rough parallel may be drawn between the permeability of rubber to different gases and the boiling points of the gases; and in general it may be said that the higher the boiling point the greater the rate of penetration. The specific chemical characteristics of the gas and of the rubber colloid, however, determine solubility, rate of penetration, &c., and at the moment the available facts are not sufficient to warrant saying more than this. In the main, the results of Messrs. Edwards and Pickering's work show that the permeability of rubber compounds varies with the composition, as would be expected. The ageing of rubber films is accompanied by a decrease in permeability, and a similar decrease may be affected by over-vulcanization. The permeability to any gas is found to be directly proportional to its partial pressure, provided the total pressure is constant. The variation of permeability with total pressure depends on the thickness of the rubber and the way in which it is supported. The temperature coefficient of permeability is quite high. For example, in the tests at 100°C. the permeability to carbon dioxide or helium was about 17 times the rate of 0°C.; the permeability to hydrogen was about 22 times as great at 100°C. as at 0°C.

The work carried out has certainly opened many interesting fields of investigation, and the results should be extremely useful in the innumerable cases where the behaviour of rubber in contact with gases is concerned. Those of our readers who are interested in the matter might note that the paper is now ready for free distribution, and copies will be forwarded to anyone addressing a request to the Department.

Chemical Engineering Courses

Our readers will scarcely need reminding of the admirable course of lectures on applied chemistry organised last year by the Manchester College of Technology. Many of the lectures were published at length in The Chemical Age, and the inquiries received respecting them sufficiently indicated the keen interest they aroused. For the Michaelmas and Lent Terms the Department of Applied Chemistry has arranged a course of twenty lectures dealing with aspects of chemical engineering, and the list of speakers and subjects for the first term, beginning on October 14 and ending on December 16, is one on which the head of the Department, Professor Pyman, may be congratulated. Most of the speakers are already familiar as authorities on their subjects, and the first ten lectures constitute an admirable educational course for chemical engineers and technologists.

The course will be opened by Mr. Balfour Bramwell, of the Turnover Filter Co., with a lecture on "The Design of Mechanical Filters"; Mr. A. E. Alliott will deal with "Filter Presses: their Construction and Uses," with special reference to the Chamber and Frame types; Dr. Callan, of the British Dyestuffs Corporation, will describe "the Use of Autoclaves in Chemical Processes"; and the remaining seven lectures of the first course will be by Mr. Herbert Blyth (Stachan & Henshaw, Ltd.) on "High-speed electric telpherage"; Mr. H. M. Ridge (The Ridge Roasting Furnace & Engineering Co.), on "Roasting Furnaces for Sulphide Ores"; Mr. J. H. West on "The Handling of Liquids in Chemical Works"; Mr. H. M. Dunkerley (Peter Brotherhood & Co.) on "The Cooling of Liquids"; Mr. F. J. Broadbent (Thomas Broadbent & Sons, Ltd.) on "Centrifugal Extractors and Separators Applied to the Chemical Industry"; Mr. W. A. Barron (Fraser & Chalmers Engineering Works) on "Disintegrators and Sizing Appliances for Ores, Rocks and Similar Materials"; and Mr. Basil Heastie (Kestner Evaporator & Engineering Co.) on "Acid Elevators." The subjects, it will be seen, are of great technological interest, and the lecturers all bring to their tasks a fund of practical works experience in addition to the necessary theoretical knowledge.

Restricted Dyestuff Imports

The reply of Mr. Percy Ashley, of the Board of Trade, to the deputation from the Chemical & Dyestuff Traders' Association, which waited upon him recently, was marked by the reserve which one would expect in the circumstances. So far, however, as it goes it is favourable to the position of the trader. It is clear that of the alternative courses open, the Government have definitely chosen as the most effective the prohibition of the importation of synthetic dyestuffs except under licence, and that a Bill dealing with the question will be introduced in Parliament as early as possible. In carrying out this policy it is well to know that the Government have fully in mind the importance of avoiding any unnecessary handicaps on the trades dependent directly or indirectly on an adequate supply of dyestuffs. Everyone agrees as to the need of a self-dependent dye industry, but the establishment of a native dye-manufacturing industry would be dearly purchased at the cost of damaging a number of other national industries. That risk must be guarded against with the utmost care. The assurance that the Board of Trade fully appreciate the importance of the interests represented by the Association is welcome, and we have no doubt sincere. No class have better opportunities of knowing the invaluable part taken by the merchant class in developing British trade in all parts of the world than the responsible officials of the Board of Trade, and although a handful of British manufacturers may be strong enough to do without them the great majority

of manufacturers will still need as much as ever the co-operation of the merchant in disposing of their surplus production.

The proposals of the Association cover a wide field—too wide to be dealt with in detail by an official reply—and it is satisfactory to have Mr. Ashley's promise that they will receive "full and sympathetic consideration." One new point in the memorandum we have not seen mentioned elsewhere is that, in fixing the "appointed date" on which the new measure is to become operative, reasonable regard should be paid to existing commitments. This, of course, does not mean that the speculative type of trader will be allowed to rush in and secure unlimited supplies in advance; it means, as we understand it, that reasonable consideration will be given to regular trading firms respecting contracts which must necessarily be entered into some time before delivery. Another point that will require attention is the importation of stuff for re-export. This has always been regarded as an important section of British trade, and the Association, which has obviously gone into the situation very thoroughly, would be rendering a further service if it could formulate a scheme by which the interests of the re-export trade could be protected without hampering the national purposes which the Government measure is intended to secure.

The Storage Tank Danger

The recent disaster to a tank barge on the Thames at Millwall, coupled with the cases of explosion in storage vessels already referred to during the present year, should serve to emphasise the scrupulous care which is necessary to ensure thorough cleaning before such vessels are entered for repairs or other purposes. This is the second accident which has happened to barges within the past few weeks, and the experience would seem to point to the fact—contrary to general opinion—that fuel and other oils are by no means immune from risks of the kind. Previous fatalities have usually been associated with comparatively volatile spirits such as benzol, in which case the danger should be self-evident. Now, however, that oils have shown themselves to be almost equally dangerous, we are prompted to ask, in view of the enormously increased use of oil for ship propulsion, what precautions are being taken in connection with the re-fuelling of ships from oil tenders and barges? Also whether there is not some recognized routine, ensuring safety, to be followed when the storage tanks of oil-driven ships are cleaned?

An oil—particularly fuel-oil—is unfortunately very difficult to deal with, for whereas the remains of a more volatile substance may be effectually disposed of by a sufficient period of ventilation or by the admission of a stream of compressed air, it may take weeks to dry out an oil in this way, particularly in a barge or ship where the projecting angles and other members usually preclude pumping dry. One successful method is that of blowing out the tanks with steam, followed up by a thorough scouring with swabs. In some cases the tanks are completely filled with water, thus bringing the oil to the surface and allowing it to be run off through overflows near the top. All such methods, however, entail considerable trouble which, in order to save time, results in risks being taken. It would seem, therefore, that the time has come for the factories branch of the Home Office to take the matter up and to impose stringent regulations such as will preclude the recurrence of quite unnecessary accidents of the kind.

Pulp and Paper

In view of the increasing attention given of late to the paper-making industry, and especially to the search for new sources of raw materials, the new volume on "Modern Pulp and Paper Making," by G. S. Witham, sen., published by the Chemical Catalog Co., New York (pp. 599) is quite opportune. The author, who is the manager of the Mills Union Bag and Paper Corporation, Hudson Falls, disclaims any authority to deal with the subject from the chemical side, but he succeeds in presenting a very complete and well-proportioned account of the industry as it has developed in the United States. He deals, it is true, mainly with the mechanical methods of producing wood or ground pulp, but he also describes well, without going into too profuse detail, the recognised chemical methods of producing pulp or cellulose—the sulphite, soda, sulphate, and Kraft processes. The author discreetly declines to pronounce judgment on the relative merits of the different processes, but his account of them is clear and informing, and sufficiently full for the general reader. The book is especially good in its treatment of mechanical processes and plant, and is liberally illustrated with views of machinery, diagrams, &c. It constitutes a thoroughly complete and practical treatise, written by one who brings to his task a long and comprehensive experience. It may be recommended as quite fulfilling the author's purpose of providing a text-book which practical paper makers will find useful and instructive, and which, without claiming to be strictly a scientific work, will be of service to technologists not intimately in touch with the American pulp and paper industry, and desiring to know the salient facts about it.

The Calendar

Oct.		
9	North of England Institute of Mining and Mechanical Engineers: General Meeting. 2 p.m.	Wood Memorial Hall, Newcastle-on-Tyne.
9	Mining Institute of Scotland: General Meeting.	Edinburgh.
11	Biochemical Society. 5 p.m. ...	King's College.
12	Royal College of Science, Old Students' Association: "The Proposed University of Science and Technology: Can a Useful and Worthy University be Based on Pure and Applied Science?" by J. W. Williamson	Imperial College of Science and Technology, South Kensington.
14	Manchester College of Technology (Dept. of Applied Chemistry): "Design of Mechanical Filters," by Balfour Bramwell. 6.30 p.m.	Manchester.
15	Society of Dyers and Colourists: Presidential address by Lord Moulton.	Bradford.
18	Physical Society of London and Faraday Society (Joint Meeting): "The Physics and Chemistry of Colloids."	London.

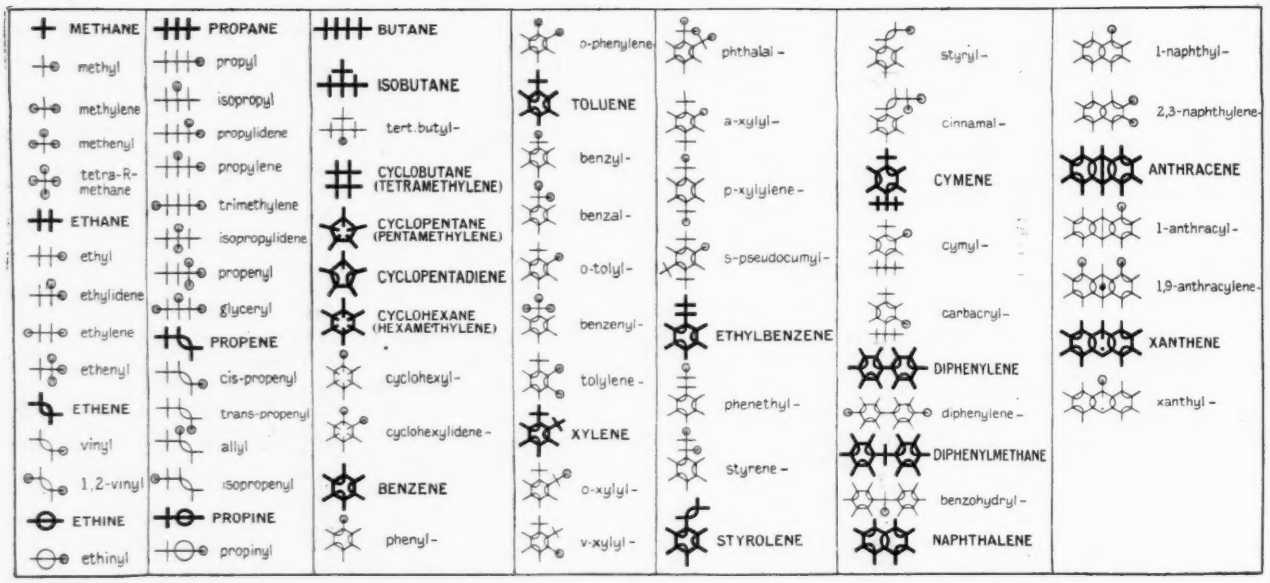
Structure Symbols of Organic Compounds and Radicals

By Ingo W. D. Hackh

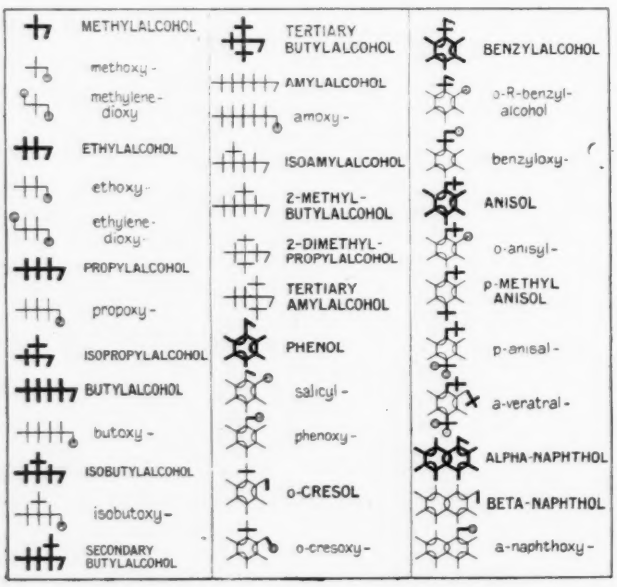
The following article deals with a new principle of chemical notation, and introduces a system which, while permitting of the structure of any compound being shown, eliminates the cumbersome structural formulæ as commonly employed. Our contributor has made a detailed study of the new method, and the diagrams he has prepared will no doubt excite considerable interest.

THE purpose of a structure symbol is to represent the arrangement of the atoms in the organic molecule in a more simple and accurate way. Fundamentally the structure symbols are, however, nothing new; they involve no new theory or conception of organic structure; they are purely a technical device offering various advantages. It is a known sentiment among chemists that the ideal way is the representation of every organic compound by its structure, but the realisation of this ideal has been encumbered by the limitation of space and the difficulty of type-setting ordinary structure formula. By the new system of notation this ideal can be realised, for the structure symbols show the structure of any organic compound in a very narrow compass. Since the idea originated two years ago* the structure symbols have passed through the stages of

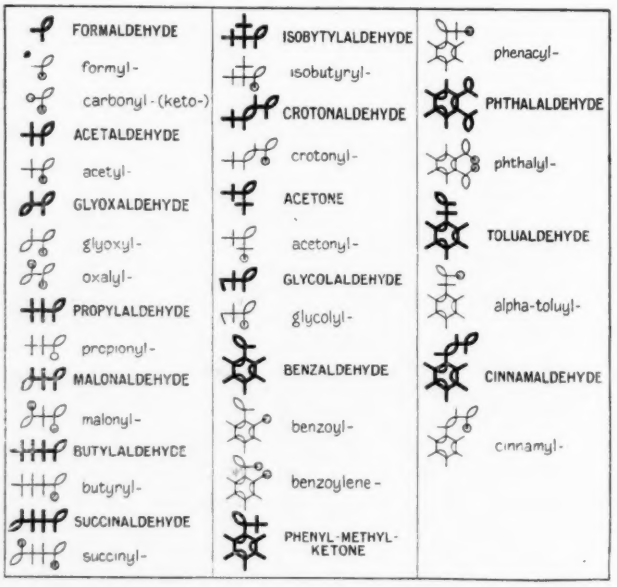
**Can. Chem. Journ.*, II., 135 (1918); *Science* N.S., XLVIII., 333 (1918).



(1) HYDROCARBONS.



(2) ALCOHOLS, ETHERS AND PHENOLS.



(3) ALDEHYDES AND KETONES.

infancy and have been further developed,* having been favourably and unfavourably criticised, as is common with any new procedure, and have been extensively used by the author, who has gained some practice by compiling a systematic list of about 2,000 structure symbols. Like many new ideas which involve initial inconvenience, the structure symbols are apt to receive at first sight an indifferent or even condemning verdict, but on second thought, combined with a little practical use, they stand the test of superiority over conventional structure formulæ.

The principle of the structure symbol is to depict the bonds between the individual atoms by lines and to eliminate the ordinary symbols for C, H, O, and N. As the majority of all organic compounds contain some of these four elements, the elimination of these symbols from a structure formula saves time and space without depreciating accuracy. The valency of these four elements, whether considered from the old standpoint or the newest developments of atomic structure, is one for H, two for O, three for N and four for C. A single line represents then the valency or bond of the old school, and two electrons of the new school. The four typical atoms are indicated in the structure symbols by the number of lines radiating from a given point; thus, at the point where a line ends or begins hydrogen is situated, where two lines come together or a line makes an angle oxygen stands, where three or five lines radiate nitrogen is located, and, finally, where two lines cross, that is, a point from which four lines radiate, carbon exists. This simple key to the whole system of notation is shown schematically in the following diagram:—

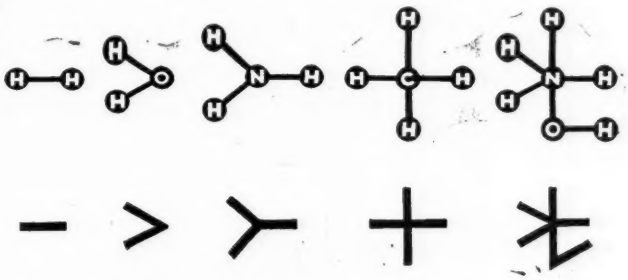
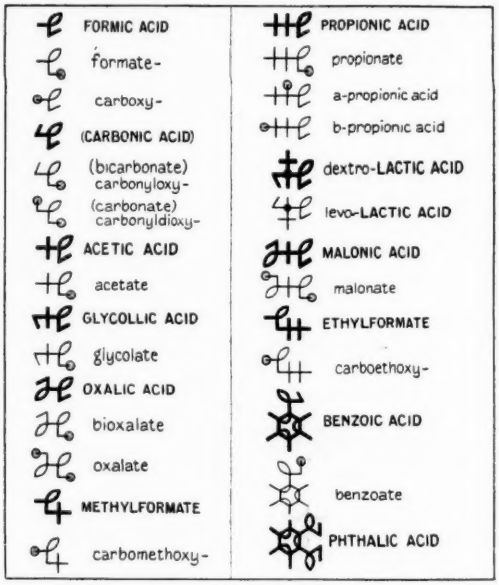


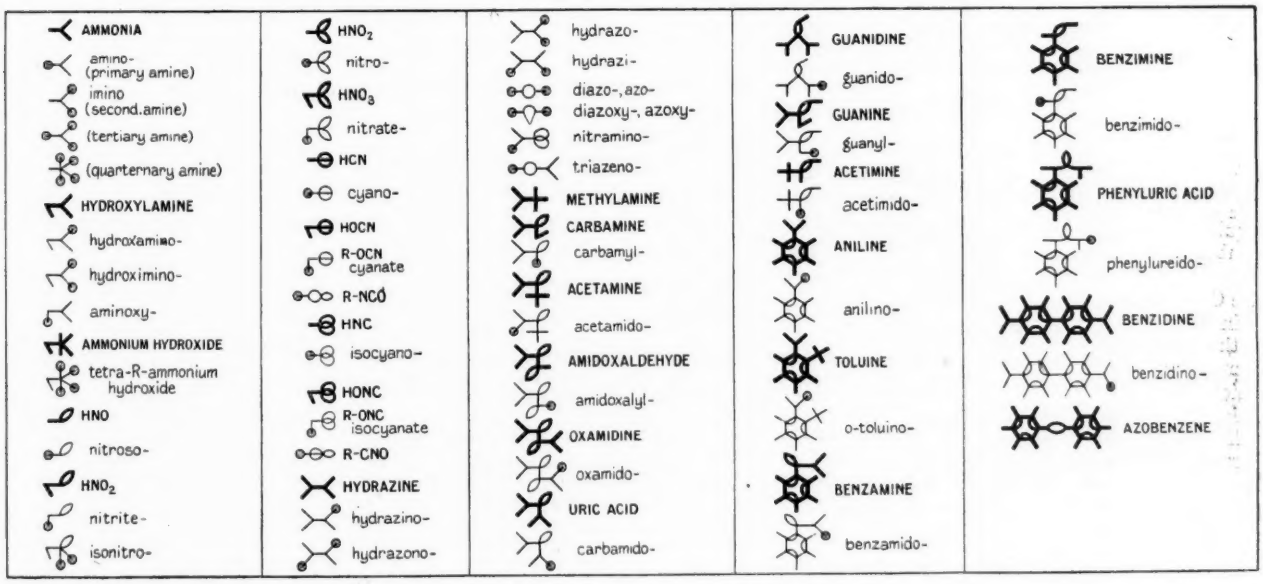
FIG. 1.—STRUCTURE SYMBOLS OF HYDROGEN GAS, WATER, AMMONIA, METHANE, AND AMMONIUM HYDROXIDE.

The simplicity, accuracy, and exactness of the structure symbols have been pointed out in previous papers, but the experience with these symbols has made it advisable to formulate a few rules: (*a*) Assymetric atoms are indicated by a dot at the junction of the lines (*e.g.*, lactic acid); (*b*) heterocyclic atoms are indicated by a dot placed outside the lines (*e.g.*, xanthene); (*c*) single bonds are straight lines and if possible of equal length; (*d*) double bonds are curved lines; (*e*) ring compounds are geometrical figures, therefore, a pentacyclic compound becomes a pentagon, a hexacyclic compound a hexagon, &c. (*e.g.*, cyclopentane, cyclohexane, &c.). These rules are necessary to insure uniformity and clearness of the structure symbols; the dots *e.g.* are used to draw attention to points of interest in the symbol.

* *Chem. News*, CXVIII., 289 (1919); *Chem. Eng.*, XXVI., 377 (1918).



(4) ACIDS AND ESTERS.



(5) NITROGEN COMPOUNDS.

Little effort is required to become familiar with the appearance of typical radicals, for the geometrical design of characteristic groups impresses itself readily upon the memory. These groups are then instantaneously recognised even in the most complex structure symbols, and thereby greatly facilitate the understanding of a compound and at the same time eliminate the laborious way of reading each of every letter of the customary structure formula. The whole structure of a compound can be taken in at a single glance and remembered as a definite picture. The structure symbols for the common radicals of alcohols,

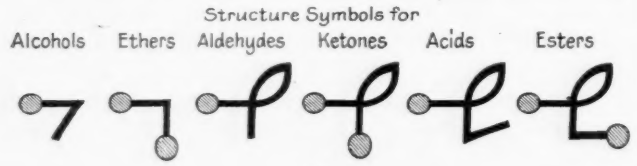
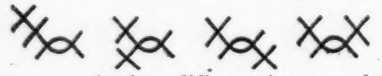


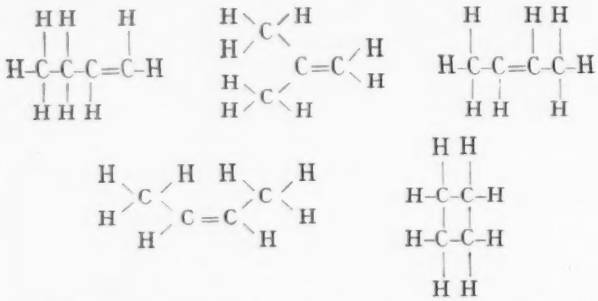
FIG. 2.

ethers, aldehydes, ketones, acids, and esters illustrate clearly the relationship existing among these six important types of organic compounds. Thus, alcohols and ethers, aldehydes and ketones, acids and esters differ in the same way by the attachment of one and two radicals; the shaded circle indicates the location at which another radical is attached to the group.

The facility with which isomeric forms of a compound can be represented is remarkable. Thus, for a compound like C_4H_8 the structure symbols



show in a narrow compass the four different isomers of the aliphatic series, while illustrates the ring compound with the same clearness and accuracy as if the ordinary cumbersome structure formula had been employed, viz. :—



While these compounds could have been written in the rational formula $C_2H_5 . C_2H_3$, and $(CH_3)_2{=}C_2H_2$, and $CH_3 . C_2H_2 . CH_3$ it is evident that the cis- and trans-form requires the full structure formula, and that the structure symbol indicates the relative position of every atom in the molecule and thereby eliminates the use of dubious radicals like C_2H_3 and C_2H_2.

In the accompanying figures is a systematic list of some of the more important compounds and the radicals derived therefrom. A shaded circle indicates always the position at which the hydrogen can be replaced by another radical. This list is self-explanatory, and contains practically all the radicals mentioned in *Chemical Abstracts*,* together with the nomenclature accepted by the American Chemical Society. It is hoped that the list may be of service and value in the use of structure symbols and the American nomenclature.

San Francisco, Cal.,
College of Phys. and Surg.

* *Chem. Abstr.*, X., 3400 ff, 1916.

Reviews

THE MANUFACTURE OF SUGAR FROM THE CANE AND BEET T. H. P. Heriot, F.I.C. (Monographs on Industrial Chemistry, edited by Sir Edward Thorpe, C.B., LL.D., F.R.S.), pp. 426. Longmans, Green & Co., London, 1920. 24s.

"It has often been stated that the sugar producer can only be trained in the factory, theoretical knowledge being of little value. The aim of the present work is to show that successful practice is becoming more and more dependent on scientific principles, which can be studied more effectively outside the factory than inside."

"In concluding this brief study of the sugar factory and refinery, attention may be drawn to the fact that the remarkable technical progress made within the past century has not been effected by the so-called *practical man* or *sugar producer*, but by a comparatively small number of men who built the *theoretical foundations* upon which modern practice stands. Many centuries of *practical experience* failed to improve the primitive methods of cane-sugar manufacture. *Theory* evolved a new plant (the sugar beet); discovered and perfected a new method of extracting the sugar; and within 84 years enabled Germany to produce over a million tons of beet-sugar per annum!"

These two paragraphs form the opening and closing sentences of the book, and indicate clearly the attitude of the author towards his subject and his public. The earliest sugar technologist was the negro slave who kept his knowledge to himself; the latest triumph of scientific control has been to increase the sugar content of the beet from 7 per cent. to 20 per cent. by the application of the principles of evolution. The author leaves the reader a little in doubt as to how far in advance of the primitive sugar producer he considers the modern practitioner to have progressed, in that he loses no opportunity to develop from first principles the scientific aspect of each detail of his subject.

Putting this small doubt on one side, Mr. Heriot has, we think, produced a book of just the right character. The works chemist (and perhaps even the manager, who knows?) will find his practical knowledge amplified and made living by explanations of fundamental theory. And he will doubtless agree with us that the author has the somewhat rare gift of making detail readable and not turgid.

The book is divided into ten well-balanced parts, and covers the subject from its beginnings in botany to its finish in the manufactured products, and in the disposal of by-products.

One omission will, we hope, be rectified in a future edition: we would like to see a classified bibliography of useful literature, in addition to the references scattered throughout the text in their proper places. P. E. S.

"Surplus"

No. 33, dated October 1, is now issued. A section (D.B.4C.), devoted to explosives and chemicals, is on pp. 136 and 137. Enquiries regarding this section should be addressed to the Controller, Explosives and Chemicals Section, Disposal Board, Ministry of Munitions, Block "S," Earl's Court Exhibition, S.W. 5.

R.C.S. Re-union of Old Students

A REUNION of the old students of the Royal College of Science will take place on Tuesday, October 12, at the Imperial College Union, Prince Consort Road, South Kensington. There will be an informal dinner at 6.30 p.m. (charge 4s.) followed by social intercourse and music at 7.30. At 8 p.m. the president, Sir Richard Gregory, will take the chair. An announcement of the progress made with the War Memorial will be made by Professor J. C. Philip, hon. secretary to the War Memorial Committee, after which Mr. J. W. Williamson will deliver an address on "The Proposed University of Science and Technology: Can a useful and worthy University be based on pure and applied science?" The address will be followed by a discussion.

Profiteering in Soda

Tinlings, Ltd., Fined £25 and Costs

BEFORE Mr. Bros, at the Clerkenwell Police Court, on October 1, Tinlings, Ltd., general produce merchants, 31, Cowcross Street, London, E.C., appeared to answer two summonses which had been issued under the Profiteering Act, charging them with offering for sale, by circular, soda crystals at £15 a ton.

On behalf of the defendant company it was intimated by Mr. Lane that a plea of guilty would be tendered to one of the two summonses.

Mr. Travers Humphreys, for the Director of Public Prosecutions, said the transaction in question was in April of the present year, when Brunner, Mond & Co. and the United Alkali Co. were charging £5 10s. a ton for crystals in 2-cwt. bags, and £5 17s. 6d. a ton if the soda was packed in 1-cwt. bags. That price was fixed in September of last year and was still in force in April, and the soda was regularly supplied to retailers at the prices mentioned. There was in the early part of this year a world shortage of washing soda, which probably still continued, and the result was that Brunner, Mond & Co. and the United Alkali Co. had to ration their customers. Their regular customers got their ordinary supplies, but owing to the world shortage a great many people would have liked to have bigger supplies. Many retailers would have liked to have more than they were allowed. That state of shortage brought in speculators—people who tried various schemes to corner the article. They tried to get hold of supplies and hold them up in order to increase the price.

As a result an entirely artificial price was being charged and being obtained by people, some of whom might appear before the Court. The price was forced up to £15 a ton and even beyond. The defendant company before the war, and as far as he knew since, had never had any dealings in washing soda. It was not part of their regular business, and they were not manufacturers, wholesalers, or retailers of the article. They saw an opportunity of making a profit, which was an entirely unreasonable profit, and sought to take advantage of it. On April 16 of the present year the defendant company issued the following circular :—

> "Dear Sir,—Soda crystals. Being associated with a company whose registered offices are with us, and whose capacity for output is practically illimitable, we are in a position to offer soda crystals for delivery commencing not later than June 17 at the price of £15 a ton, delivered London or on rail. As the demand for this commodity is so great and the present supply so restricted, we can only accept orders accompanied by a deposit of 50 per cent."

That letter, continued Counsel, was received by Mr. H. Cohen, wholesale and retail grocer, 31, High Street, Kingsland. Mr. Cohen had always dealt regularly with Brunner, Mond & Co., buying from them at £5 10s. a ton, and re-selling to the public at a reasonable profit. When he received the letter he at once sent it to the Board of Trade, pointing out, as was perfectly true, that if he were to accept the offer—and he was assuming that the defendants had the soda—the result must be to almost treble his price to the public. The Board of Trade considered the matter. A similar circular letter, dated April 15, was sent out by the defendant company, but it did not ask for the 50 per cent. deposit, but stated "As the demand for this commodity is so great and the present supply so restricted it will be recognised that orders accompanied by cash will receive the first consideration."

That circular letter was received by Ford & King, a firm of city grocers, who at once sent it to the Director of Public Prosecutions, in order that a prosecution might follow. The Director, however, forwarded the letter to the Tribunal appointed under the Profiteering Act by the Central Committee to consider cases of alleged profiteering on the part of wholesale firms. That Tribunal considered the matter and in each case decided that proceedings should be taken. Before the Tribunal decided the matter they wrote to the defendant company suggesting that they should forward invoices showing from whom they purchased the soda, or from whom they had received an offer.

If the defendants could have shown that they had to pay, say, £13 a ton for the crystals, the Tribunal would have taken that fact into consideration when deciding whether an unfair profit was made. The defendant company replied to the Tribunal stating that they had not yet purchased any of the commodity, but would be glad to buy a large quantity, and therefore they could not show any invoice. The defendants also called attention to an article in a newspaper which stated that the market price of soda might be anything up to £20 a ton. The defendants issued their circular letter in the expectation of securing the goods at less than £15 a ton, but up to the time of the Tribunal's enquiry they had not made any definite arrangements at all, and were actually buyers at the price mentioned. Counsel added that those facts were his justification "for describing these gentlemen as mere speculators." They were offering to deliver at £15 a ton when they had not got any of the goods and did not know whether they would be able to obtain supplies. The case came before the Tribunal on June 3, when the defendant company was represented by Mr. J. A. Tinling, the managing director. His evidence was unsatisfactory to the Tribunal and amounted to a re-statement of what the company had stated in their letter. He admitted that the company had not any soda, and that they hoped to be able to get some.

Mr. Humphreys said that in their circular letter the defendants referred to a company whose capacity of output was practically illimitable. The meaning of that was that there was a company whose name was put up on the offices of Tinlings, Ltd., which hoped some day to be able to make soda, but as late as June of the present year he understood it had never made an ounce of soda and had not any quantity in its possession. Therefore it was an offer made falsely to shopkeepers, and the circular letters were issued broadcast making an offer which never could have been carried out. The Tribunal took the view that the market price of soda crystals was that which was charged by the manufacturers of from £5 10s. to £6 a ton, and that being so, an attempt to obtain £15 a ton for a necessary household commodity was a gross attempt at profiteering. He had also to refer to another matter which seemed to show what was really in the minds of those concerned with the company when they sent out the letters. They had hoped to get soda crystals to fulfil contracts at £15 a ton from Brunner, Mond & Co. and the United Alkali Co. On April 10, a few days before the circular letters were issued, they communicated with both the firms named, saying that they were buyers of soda, and an offer of a regular contract was made.

Mr. Lane, for the defendant company, interposing, said that the circular letters were not issued until after the defendant company had received replies from Brunner, Mond & Co. and the United Alkali Co. refusing supplies.

Mr. Humphreys said that as the defendant company was pleading guilty to one of the summonses he was prepared to withdraw the other. The mere multiplication of circulars did not make separate offences. It was the attempt to obtain which was the offence.

Mr. Lane said the plea of guilty was in relation to the offer to sell goods to Mr. Cohen. Only three orders were received and two were carried out. So far as damage to the public was concerned, it was infinitesimal. Tinlings, Ltd., had carried on a considerable business as provision and store dealers, and it was not true to say that the company had never sold soda. All such firms regarded the sale of soda as part of the regular routine of their business, if they could get it. Although the company could not get large supplies they had, in fact, sold soda, and on occasions had been honoured by Brunner, Mond & Co. with small quantities. The sale of soda would be a transaction in the ordinary way of their business. Mr. Tinling, the managing director of the company, took the sole responsibility for what had happened, as the other three directors had no knowledge of the transaction, and when they came to hear about it they repudiated it. When the circular was issued, Mr. Tinling thought there would be a possibility of his getting supplies. It was not correct to say that it was hoped to get soda crystals from Brunner, Mond & Co. and the United Alkali Co. at £5 10s. and re-sell them at £15 a ton. As a matter of fact it was expected that very much more than £5 10s. a ton would have to be paid, but nevertheless a selling price of £15 could not be justified. In concluding, he desired on behalf of the directors of the company to express great regret that owing to a misapprehension as to the proper price the circular was sent out.

Mr. Bros said he was relieved of considerable difficulty in the matter by a plea of guilty, and would impose a penalty of £25 and allow £5 5s. costs.

Restricted Imports of Synthetic Dyestuffs

Chemical and Dyestuff Traders' Deputation to the Board of Trade

A DEPUTATION from the Chemical and Dyestuff Traders' Association, consisting of Messrs. F. T. T. Reynolds (Millwards Merchandise, Ltd.), A. F. Butler (R. W. Greeff & Co.), and H. Gilliat (E. G. Jepson & Co.), with the secretaries attended at the Board of Trade on Saturday, September 25, to lay before the Department a statement of their views on the Imports Restriction Bill expected shortly to be introduced by the Government. They were received by Mr. Percy Ashley.

The Merchant's Services to the Empire

Mr. Reynolds, chairman of the executive council of the Association, in stating the case, emphasised the important part which the merchant interest had played in establishing the supremacy of British trade in so many parts of the world, and claimed that it had rendered services of Imperial value by initiating extensions of production, by finding outlets for British manufacturers' surplus production, by searching out and developing new markets, often securing business for the United Kingdom by way of payment for goods imported, and by specialising in matters of detail such as packing, marking, financing, shipping, &c.

"Under present abnormal conditions," he said, "I submit that the need for the importing and exporting merchant is greater than ever as the exchange of commodities, with an increasing balance in favour of exports, provides one of the surest ways of re-establishing the stability of monetary exchange. It is recognised that hitherto the merchant interest has suffered through want of collective organisation. So far as the important trade in chemicals and dyestuffs is concerned this defect has been rectified, and we have every confidence that our association will render assistance to the Board of Trade, if and when opportunity arises."

Restriction of Imports

With regard to the imports and exports restriction question, he said that contrary to expectation, shortage of colours became as acute 12 or 18 months after the signing of the Armistice as at any period during the war. The Government supported enterprise from which so much was expected had so far proved disappointing and unsatisfactory. The future position and soundness of the British Empire was said to be largely dependent upon the restoration, maintenance, and expansion of our export trade. Great volumes of our export trade were still dependent upon certain imported dyes and intermediates, and although since the Sankey judgment there had been an open door for importation, available supplies had continued inadequate.

"We freely accept the general principle," he proceeded, "that as far as possible the United Kingdom should be independent of external supplies of chemicals and dyestuffs, but the present position appears to indicate that the policy hitherto pursued has not been altogether successful in securing either the range, quality, or quantity of the materials required. This may be through the failure of the State-aided and amalgamated corporation to rise to the occasion or to the methods and personnel employed with regard to importations and distribution or to both. In any case, if the shortage has not been alleviated whilst the import door was wide open, it is difficult to see how the partial closing of the import door is going to assist. Common sense rather suggests the contrary effect.

"To accomplish the avowed intention it may fairly be emphasised that the stimulation of home production on an extended, and if possible, co-ordinated basis, should be the first concern, and if the present resources are inadequate or incapable, whatever changes or extensions that are necessary should be most carefully thought out and worked under fully qualified and experienced supervision. It may also be suggested that other manufacturing concerns of present or potential values should receive practical encouragement and assistance with a view to increasing and expediting a production of chemicals as well as dyestuffs in quantity sufficient not only for home consumption but also to allow free exportations. We have some ground for the belief that the intended legislation is more concerned with imports than with exports, and we earnestly hope that at an early date the position will enable exports to any destination to be encouraged rather than restricted subject to any reasonable limitation.

The Policy of Restricted Imports

"Regarding importations, four alternative courses have been suggested :—Free Imports, Tariff, Subsidy, Licensing.

"The Government do not appear to favour a continuance of free imports on the ground that this would defeat the policy of self-dependence. Such a conclusion may be challenged when the proposals are debated in the House of Commons, but in the meantime must be accepted. The imposition of a tariff upon a discriminating basis could not be justified unless a mandate or fairly general agreement is obtained. There is much to be said in favour of a subsidy as being on the whole the least costly and most effective way of accomplishing the end desired, especially if the colour users agreed to the course, suggested from their own ranks, that a fund should be provided by the colour users upon an assessment basis to be accorded by way of drawback to the colour makers. This course, however, does not to appear to have met with general favour amongst those concerned, nor indeed to have received adequate consideration. There only remains the policy of importing under license. We agree with the chairman of one of the largest consumers' associations in the United Kingdom that the previous experience of a licensing system was found "cumbersome and inequitable." He might have added with equal truth "ineffective."

Practical Suggestions

"We understand that this system is about to be reimposed. If so we would urge :—

(*a*) That the licensing authority should be composed mainly of practical and experienced men with technical and administrative knowledge; that they should not be selected arbitrarily by a Government Department, but that they should be nominated by the interests affected; that the consuming trades should be preponderatingly represented by the nominees of their associations, and that the manufacturers and the importers and exporters (the distributing factor) should each have representatives nominated by their respective associations to safeguard the various interests concerned.

(*b*) That the interests directly concerned should be consulted before the administrative machinery is set up and that whatever charges or fees are imposed should be based upon a clearly defined principle that would be fair and equitable in its incidence and capable of being generally understood; also, that there should be a right of appeal. It is further suggested that the "appointed date" of any new legislation should be sufficiently far ahead to enable reasonable arrangements to be made respecting existing commitments.

(*c*) That whatever system and medium are adopted for importation and distribution, regard should be shown to existing channels possessing lengthy experience, and being not without claim for special consideration."

Mr. Ashley's Reply

In his reply to the deputation Mr. Ashley drew attention to the statement made by the President of the Board of Trade in the House of Commons on July 20 to the effect that in the opinion of the Government, assistance to the synthetic dyemaking industry could be most effectively given by the prohibition of the importation of synthetic dyestuffs except under licence, and that proposals to that effect would be embodied in a Bill relating to key industries which would be introduced and proceeded with as soon as possible. Sir Robert Horne had added that in carrying out this policy it would be the object of the Government to facilitate the work of the trade as much as possible.

Mr. Ashley added that it was not possible for him, in advance of the introduction of the Bill, to give any further indication as to its precise scope and provisions, but the deputation were assured that the Board fully appreciated the importance of the interests which they represented, and that in the framing of any scheme of administration full and sympathetic consideration would be given to the various suggestions which they had put forward.

Informal discussion of these suggestions then followed and the interview concluded with a cordial expression of thanks to Mr. Ashley.

Industrial Conditions in Chemical Factories

Chief Inspector's Annual Report

THE annual report of the Chief Inspector of Factories and Workshops for the year 1919 was issued this week. [Cmd. 941, 1s. 6d. H.M. Stationery Office.] It supplies a comprehensive review of industrial conditions in works and is especially interesting as a record of the transition from War to Peace in the first year following the signing of the Armistice. We give below some extracts relating to explosions, dangerous trades, and other matters of chemical interest.

Explosions

The most disastrous explosion in 1919, involving the deaths of 12 men and injury to seven others, occurred in an oil-tank steamer undergoing repairs in a dry dock at Cardiff. The fore-peak tank was empty, and about five hours before the explosion a man-hole communicating with the pump room above had been removed preparatory to filling the tank with water for testing purposes. Certain repairs were being executed in this pump room, and contrary to all instructions and regulations a naked light was used for illumination. There was evidence that oil had leaked into the fore-peak from a pipe communicating with the coffer-dam, and, this oil volatilising, had formed with the air in the fore-peak tank, a highly explosive mixture. In ordinary circumstances the leakage of oil into the fore-peak would have been an impossibility, but unfortunately instead of filling the coffer-dam with water which would thus form an absolute seal between the tanks containing oil and the forepart of the ship, it was filled up for the voyage to England with a light crude oil. This misuse of the coffer-dam, designed as it is to safeguard the crews of oil-carrying vessels, was a serious irregularity, and this infringement of a safety precaution together with the clear disobedience of the other regulation referred to, namely, the use of naked lights, undoubtedly caused the explosion and the consequent serious loss of life.

Synthetic Acetic Acid

Two different explosions at a large chemical works resulting in the death of two men occurred in the manufacture of synthetic acetic acid and the circumstances are detailed by Mr. Ward (Derby).

"The cause of these mysterious explosions was, after lengthy and careful investigations by expert chemists employed by the firm, found to be due to the presence of minute traces of copper acetylide. The plant at which the explosions occurred was erected during the War period for the manufacture of synthetic acetic acid by a process new to this country, hence no data were available to the firm as to any special dangers which might arise in the various processes through which the materials passed, and the necessary steps to avoid dangers inherent to the processes could only be determined by experience as the manufacture proceeded. The first explosion occurred in a cast-iron vessel in which acetic aldehyde was subjected to an oxydising process; after careful investigation it was thought that the explosion might have been caused by the disruption of copper acetylide minute traces of which might have been formed by the combination of free acetylene and the copper in the brass fittings attached to the vessel. The difficulty of determining the cause was enhanced by the paucity of information concerning the properties of copper acetylide and by the fact that repeated tests to detect free acetylene had led the management to negative its presence in the oxidising process. After this explosion which resulted in the death of one man and serious injury to another it was decided to remove all copper and brass fittings from these vessels. A few weeks afterwards another explosion occurred with fatal results whilst the purification vessels (used in the stage immediately subsequent to the oxidising process) were being dismantled. In this case the explosion occurred in a copper cylinder, and the presence of copper acetylide was very definitely determined. These accidents therefore prove beyond doubt that copper or brass vessels or fittings should not be used in the manufacture of synthetic acetic acid owing to the practical difficulty of completely eliminating free acetylene."

A number of explosions of a more or less unusual type are mentioned by several inspectors. Mr. Roos (South-West London) describes one which occurred in a machine for polishing powered aluminium. The door of the polishing machine room in this case was fitted with an interlocking device to prevent entry whilst the machines were in motion, but this was temporarily put out of action by two workers whilst trying a new machine, and as a result they were burned by the flame of the explosion. The origin of the explosion is difficult of explanation as the machine was earthed and there should have been no risk of sparking from static charges of electricity such as appear to have given rise to some explosions in aluminium polishing machines in the past. However it is possible that a small particle of grit found its way into the powerded aluminium, although this is difficult to account for as the powder was passed through a 1/200 mesh sieve before introduction to the machine.

Aniline Dye Industry

An explosion involving the deaths of two men occurred in an aniline dye manufactory. Electrically driven drums containing loose iron bars were used for grinding dye substances and apparently whilst a charge of anachrome brown was being placed in one of these drums a violent explosion occurred which wrecked the grinding shed. Smoking and naked lights were strictly prohibited here, but matches were found in the pockets of one of the men killed and a partly smoked cigarette discovered among the debris. Mr. Jones (Bradford) reports on an explosion in the reduction of nitrobenzene into benzidene, the reducing agent being nascent hydrogen evolved by the action of caustic soda on zinc dust, and the district inspector (Mr. Taylor) gives particulars of an explosion of carbonaceous dust in the casing of an elevator used for conveying dextrine. The bursting of a steam jacketed pan used for sugar boiling is described by Mr. Chasteney (Sheffield). The attendant in ignorance shut the outlet cock entirely, so that the vessel was subjected to full boiler pressure and gave way. The outlet tap for such vessels should be so constructed as to always leave a slight opening to allow a through passage of steam. This precaution was taken after the accident. An unusual explosion accompanied by burning in a plant for the purification of salicylic acid by means of sublimation in a current of hot air is reported by Mr. Brothers (Warrington). The precise cause is difficult to assign, but Mr. Brothers thinks the remedy lies in preventing too high a temperature in the sublimation vessel containing the impure material. Mr. Seal (Manchester) also refers to an internal explosion in the disintegrator of a dextrin works caused by some foreign substance getting amongst the material.

Dangerous Trades

The observance of the special rules and regulations for dangerous trades is stated to be still below the pre-war standard.

Vitreous Enamelling

There has been a steady increase in the use of leadless enamels in this process, and in the Wolverhampton district where it is carried on to a considerable extent, no cases of lead poisoning have occurred during the year.

Nitro and Amido Derivatives of Benzene

Mr. Peacock (Huddersfield) reports that the application of these regulations appears to have been very successful in preventing cases of poisoning, as no case of toxic jaundice has been reported since January, 1917.

Lead Smelting

The requirements of this code have generally been well observed, and in one works in the Wrexham district improvements have been made by which some of the manual operations in the manufacture of yellow lead have been replaced by machinery, thus reducing the amount of exposure of the workers to lead dust and fumes.

Refractory Materials

The regulations regarding refractory materials were gazetted April 29, 1919, and the reports show that considerable progress has been been made in securing compliance with them.

Cold Vulcanisation of Rubber

The process of vulcanising india rubber by means of bisulphide of carbon is commonly known as "cold-curing," and a

fair standard of observance of the special rules is met with in most works. The rules are now, however, inadequate in certain important details in view of modern developments in the trade, notably as regards the use by certain firms of other solvents in place of carbon bisulphide. These solvents, such as benzol and certain chlorine compounds, introduce dangers to health commensurate with those attributable to carbon bisulphide, and their use requires regulation in the same way. The drafting of suitable regulations to replace the present rules is therefore under consideration.

Chemical Works

It is recognised that the rules with regard to chemical works are quite inadequate to meet the conditions existing in modern chemical plants and shortly before the War new draft regulations, based upon the safety precautions adopted in the best works, had been prepared, and it is hoped that these will be issued in the near future. The existing rules have been well observed, and in many works both during the War period and subsequently, the conditions have been vastly improved and the safety of the worker given more consideration. Improved types of rescue appliances have been provided, and in some cases working clothes have been supplied by the employers.

Tar Distilling

Several gassing accidents have occurred in tar stills in the North-Eastern Division, and Mr. C. F. Wright (superintending inspector) is far from satisfied with the observance of these voluntary regulations or with the rescue and first aid appliances provided.

Industrial Diseases

The cases reported of lead poisoning for 1919 numbered 207 against 144 in 1918, but this increase is considered unavoidable with the return to ordinary trade. Twenty-six of these cases proved fatal. One case of phosphorus poisoning was reported in 1919 against three in 1918; arsenic poisoning four against three; mercurial poisoning seven against nine; toxic jaundice three against 34. The three cases in 1919 were due to T.N.T. poisoning, and all proved fatal.

The cases reported in 1919 as accidents due to escape of gas number 132, and are classified as follows:—Carbon monoxide, 85 against 54 in 1918 (12 fatal); carbon dioxide, 3 against 5 (1 fatal); sulphuretted hydrogen, 3 against 7; sulphur dioxide, 7 against 1; chlorine, 9 against 4; nitrous fumes, 5 against 27 (2 fatal); ammonia, 8 against 6; benzol, naphtha, analin, 9 against 7 (3 fatal); tetrachlorethane, none; other cases (ether, acetone, acetic anhydride, &c.), 3 against 1.

The Molecule in Crystalline Solids

By Professor Bragg

THE first meeting of the Manchester Section of the Society of Chemical Industry for the 1920-1921 Session was held at the Grand Hotel, Manchester, on Friday, October 1, Mr. John Allan presiding. There was an attendance of over 200 members.

A paper on "The Structure of the Molecule in Crystalline Solids" was read by Professor Bragg, who stated that it had become more and more difficult to define the dividing line between physics and chemistry as the extent of present day knowledge increased. Chemistry dealt with the forces which came into play when atoms combined together to form chemical compounds; physics dealt with the behaviour and properties of those atoms and molecules considered singly or in mass. Both sciences had a common goal, for if the structure of the individual atoms could be understood then their physical and chemical properties could be explained, and it was in the advance towards this end that the two sciences converged.

The physical conception of the atom was that of a number of negatively charged electrons grouped around an exceedingly small positively charged nucleus, the number of electrons being such that the positive and negative charges neutralised each other. The number of the electrons could be counted, and it was found that this number increased steadily in passing from one element to the next in the series of known elements. Hydrogen had one electron, helium two, lithium three, and so on, until the most complex known element was reached, uranium having 92 electrons around its nucleus. Certain physical properties showed a regular progression with the number of electrons, and had led to the idea of the "atomic number" as a fundamental constant, a number which expressed the position of the element in the series.

The Periodic Table

In distinction to this regularity, the chemical properties of the elements were periodic in nature. The elements could be arranged in the Periodic Table, certain characteristic properties reappearing at regular intervals as elements of higher atomic numbers were reached. This had led to the idea that the electrons were arranged in a series of spherical shells around the nucleus. It was the outermost incomplete shell which determined the chemical properties of the elements. Those which had corresponding numbers of electrons in their outer shells had similar chemical properties, and occurred in the same vertical column in the Periodic Table. Those atoms which had complete outer shells possessed great stability and had no tendency to combine with other atoms; they formed a group of elements known as the inert gases. The chemical affinities of other elements represented the tendency to the outer shells to revert to a more stable form.

In this attempt to realise greater stability, the atoms grouped themselves together into the molecules of a chemical compound. By a study of crystalline structure the manner in which this was done in the case of solid bodies could be examined. The structures of a number of the simpler crystalline forms had been determined and we now knew the arrangement and the distances apart of the atoms in the molecule. These relations threw some light upon the nature of the interatomic forces.

Two classes of chemical combinations, already indicated in many other ways, were clearly distinguished. In the first class, the atoms took up a more stable configuration by parting with, or taking up, electrons until their outer shells had the same number of electrons as the inert gases. In doing this they necessarily acquired a positive or negative charge, they became "ions," and the solid body was held together by the attraction of the oppositely charged ions. In other cases an atom acquired the requisite number of electrons for stability by holding a certain number of electrons in common with another atom, and the forces which now acted as a link were of the same nature as those which bound the individual electrons to either atom. The crystalline structures revealed the existence of these two types of atomic linking. In the first class of compounds the forces holding the atoms together could be calculated in terms of charges on the ions and their distances apart, and these forces were in numerical agreement with the known chemical energy of combination.

The forces which came into play when atoms shared electrons could not be calculated so simply, but it was to be hoped that from the chemical energy it might be possible to calculate the forces holding the electrons of the atom in place, and so arrive at a clearer conception of the atomic structure.

A long discussion followed, in which Messrs. Allan, Harrison, Strafford, Thomson, Hilditch, Henderson, and Smith took part.

Prof. Snape and the University's Appeal for Funds

Professor Snape, who was on a visit to the section from Capetown, referred to the appeal of the Manchester University for funds in order to enable it to carry on its work. He said that he had followed very closely the result of that appeal, and felt that he ought to speak quite openly concerning it. He had been disappointed at the result, particularly so because Manchester was his own University. Liverpool, always the rival of Manchester, was doing far better. All present would understand the great importance of helping on the work that Professor Bragg and others were doing because there was no telling what would be the practical outcome of their investigation. It had always been a matter of surprise to him how much the English Universities seemed to have done on so very little; particularly so when one remembered the large sums of money that were given to the American Universities. English professors experienced extreme difficulty in obtaining anything like reasonable sums of money for the carrying on of their research work. He thought it indicated there was a good deal of special ability in the Old Country. Comparisons were odious, but in Capetown, in less than a month, they had raised £216,000 for a similar purpose, whereas Manchester had only raised about £215,000 in eight months. Capetown was not as wealthy a place as Manchester. It struck him that many people round about his native city did not seem to fully realise the obligations that were upon them to help to carry on the work of the Manchester University.

Carriage of Chemicals

Grievances of Manufacturer and Trader

In an article on "Rail Conveyance of Chemical Commodities" in the current issue of the *Journal of the Society of Chemical Industry*, Mr. J. Lukes states that while it is felt by the public generally that some measure of increased charge may be due to the respective companies for railway conveyance, terminal services, station accommodation, &c., whichever service or services may be performed for the trader, it is essential that the rates and conditions on which such increases are based should be equitable and reasonable. Unfortunately Mr. Luke contends such a position does not exist in respect of the chemical industries. The first stumbling block to the chemical manufacturer is to be found in Section 105 of the Railway Clauses Consolidation Act, 1845, which enacts that no person shall require the company to carry upon the railway any aqua fortis, oil of vitriol, *or any other goods which in the judgment of the company may be of a dangerous nature;* the second is that under Part 4 of the Railway Rates and Charges Order Confirmation Acts, 1891-1892, the railway companies are empowered to charge for dangerous goods such reasonable sum as they think fit in each case. Thus they can decide finally as to what merchandise is dangerous, charge what reasonable sum they think fit, carry or refuse to carry. The extent to which they have used their power is amply demonstrated by the fact that the regulations and conditions applicable to the carriage of dangerous goods in the General Railway Classification for the year 1890 occupied 38 pages, whilst in the classification for 1920, out of a total of 488 pages no less than 212 are taken up by the special classification for so-called dangerous goods.

"This freedom in the matter of acceptation of traffic and fixing of rates and conditions (without statutory check and effective means of criticism)," Mr. Luck continues, "was conferred upon the railways years before it was realised that the chemical industry was indispensable to the national interests, and it is seriously questioned whether Germany would have outstripped this country in chemical production, and initiative (in the manner she did, as was made clear by the war) had our railways not discouraged the internal movement and interchange of chemicals by levying charges which prohibited the movement of heavy raw materials, except for very short distances, and restricted the transit of intermediate and finished products by imposing onerous rates and conditions. It is beyond doubt that the manufacturers found it better business to export direct semi-manufactured chemical commodities to foreign countries—particularly to Germany—to be worked into the finished article there, rather that to incur the expense of a series of movements by rail in this country."

Comparison of German and English Charges

The following figures show the difference between the German charges and our own, (pre-war), so far as benzol, toluol, and naphtha, in owners' tank wagons, inflammable liquids, Class "A," flashing below 73°F., are concerned :—

	50 miles per ton s. d.	90 miles per ton. s. d.	130 miles per ton. s. d.
Germany	7 0	10 0	14 0
England	15 0	21 6	26 0

In America, the Inter-State Commerce Commission, with the assistance of the Bureau of Explosives, controls the classification, rating, and conditions under which dangerous goods are conveyed, and evidence recently given before the Rates Advisory Committee illustrates the unreasonable manner in which the question is dealt with in this country. It appears that in America, inflammable liquids, flashing over 80°F., are not considered dangerous liquids, whereas in this country in a recent case before the Railway and Canal Commission Court it was declared that the railway companies did not accept 150°F. as the dividing line between danger and safety, and their contention was upheld by the Court.

Particulars of the difficulties and the serious position in which the chemical manufacturer is placed have been given in evidence before the Statutory Rates Advisory Committee in connection with the hearing respecting the general revision of railway rates and charges. Trade witnesses have supported proposals that an impartial business tribunal, easy of access and inexpensive, should be appointed to have the power of classifying merchandise of every description, including dangerous goods, and of deciding the rates, charges, and conditions to be applied; and it has been particularly pointed out that the railway companies should be permitted to charge only for the services they actually perform, and for the accommodation which is provided and used. It is hoped, Mr. Luke states, that in the national interests the Committee will make such a recommendation to the Minister of Transport as will accord the chemical manufacturers and traders of this country some right to be consulted in connection with the conveyance of their merchandise and the cost; and that more reasonable and equitable terms will be obtained in the future, so that British chemical manufacturers may enjoy a reasonable chance in competing with traders in other countries where the conditions are more favourable in regard to railway transport.

Institution of British Foundrymen

Mr. W. H. Meadowcroft's Presidential Address

The opening meeting of the 1920-1921 Session of the Lancashire branch of the Institution of British Foundrymen was held at the Manchester College of Technology on Saturday, October 2.

Mr. W. H. Meadowcroft, the newly-elected president of the Lancashire branch, in the course of his presidential address to the members, said the past year had been a very trying one for everyone connected with the trade. Since 1918 they had been up against the task of reverting to normal conditions, and they had been fondly hoping for a speedy return to pre-war results, but these hopes had not materialised owing to a variety of causes. When the country was plunged into the world conflict all energies were devoted to the task of defending the Empire from a common danger. In the foundry world-old conservative ideas were broken down, and foundrymen generally showed a keen desire to confer with their fellow craftsmen on the tasks and problems which the pressing need for exceptional production compelled them to cope with. Foundryman, engineer, designer and scientist must all continue to work together to the common end of uplifting the craft from the dire straits into which rule-of-thumb methods had placed it, and they must see that it took its position as a true craft.

Shortage of Castings

The result of the past neglect of the foundry by engineers had become lamentably apparent in the past year. Great engineering works were carrying on in a lop-sided fashion, their splendidly adequate machinery and plant being partially stopped, or at the most working on a hand-to-mouth basis, owing to the inadequate supplies of castings. Of course, foundrymen were in part to blame for this, but the major portion of the criticism must be directed at those people who organised and developed huge works, perfect in every detail save one, the foundry. They were faced with a demand for castings which they could not at present meet. They had, therefore, to produce more.

Classes for Foundry Apprentices

The position of their Institution in the engineering world was being steadily advanced. As their aims and objects became better known they were hoping for greater financial help from those firms who profited by the work of the Institution. The new rule which allowed firms to become members upon an annual payment of five guineas would, he hoped, help them to increase the sphere of their usefulness. The next annual meeting of the I.B.F. would be held in Manchester, and one of the Manchester members was to be the next president. They had every prospect of making the Lancashire branch the largest and most active in the country.

With regard to the question of education, it would help matters from a foundry point of view if their members individually took some interest in the provision of special classes for foundry apprentices in their own districts. If they were to get the right type of boy in their shops they must try to make the foundry trade appeal to boys. They would then have no difficulty in choosing those who would be the most suitable from a temperamental and physical standpoint, and when they had got the right material they must see that it was trained in the right way.

Science and Industry

Malleable Cast-Iron Research Association

On Thursday, September 30, the British Grey and Malleable Cast Iron Research Association was formally brought into being at a meeting held in Birmingham. The headquarters are in that city, and Mr. T. Vickers, C.E., Lincoln's Inn, Birmingham, is the Secretary. This is the second Research Association to be formed in Birmingham under the auspices of the Government scheme, the other being in connection with non-ferrous metals.

At the meeting, at which many leading Midland metallurgists and industrial chemists were present, it was stated that there are 2,776 iron foundries in Great Britain and Ireland, the largest single town foundry area being Birmingham with 118 foundries, and the largest single county foundry area Yorkshire with 408 foundries. The chair was occupied by Mr. W. Riddell, chairman of the Institute of British Foundrymen (after the Lord Mayor of Birmingham, Ald. Cadbury, had given the movement his benediction), and an address was delivered by Sir Frank Heath, K.C.B. (Government Department for Scientific and Industrial Research), in which he stated fully the objects of the Association. He pointed out that the competition in the trade came largely from America, where a Research Association had been founded. Most promising results had been obtained, and America claimed to be able to make malleable castings of more than 50 per cent. tensile strength than was possible in this country. A research laboratory had been established in Scotland in connection with the manufacture of light castings, but there was nothing corresponding to this south of the Tweed. They must be certain of the quality and characteristics of the pig-iron they were getting, and the next thing was to know the proper condition of the metal for which the casting was to be made. These were matters for scientific investigation. Sir Frank pointed out that the application of science to industry was really nothing more than an insurance against the evil effects of ignorance. A big firm might ask why should they put their knowledge into the common pool. His reply was because it would pay. However, the Government were not going to force firms to do so, and there would be inserted in the Articles of Association a clause enabling a firm to appeal to the Council of the Association or to the Government against a Research Department undertaking investigations which covered ground which they (the firm) had already covered and spent money upon.

Professor T. Turner (Faculty of Metallurgy, Birmingham University, and representative of the Birmingham and Midland Section of the Society of Chemical Industry) pointed out, in moving a vote of thanks to Sir Frank Heath, that there were wide fields for research by the Association. It was not merely a question of the chemical composition of pig-iron, the effects of different rates of cooling or impurities in melting, but also the effect of pressure during casting, the composition of sand, and of the texture of sand apart from composition and the amount of blast employed. These were some of the fundamental research questions to be dealt with.

Researches in Magnetism

At the opening meeting of the new session of the Manchester Literary and Philosophical Society on Tuesday, Dr. A. E. Oxley read a paper on "Recent Researches in Magnetism." After dealing briefly with the nature of ferro-magnetism, paramagnetism, and diamagnetism, the author discussed the characteristic variations of these properties over a range of temperature varying from that of liquid air to 300°C. Most substances showed a change of magnetic property when crystallisation took place. Loops similar to those by nickel steels had been obtained in the case of certain diamagnetic substances. These experimental results were interpreted in terms of the electron theory of magnetism, and finally extended, through Tyndall's work on the deportment of crystals in a magnetic field, to interpret the nature of crystal structure and the special distribution of electrons within the atom. The atomic configuration arrived at was similar to that of the cubical atom developed by Lewis and Langmuir, and distinct from the Bohr theory, which did not account for the magnetic properties.. These theories might, however, be brought into line in the near future by a due recognition of the possible differences between radiating and non-radiating matter.

The Fuel Problem in Germany

Brown-Coal Distillation

In an interesting article on Germany's activities with regard to the fuel problem, a Berlin correspondent of the *Birmingham Post* states that the greatest achievements are in the domain of brown coal.

Brown coal (it is stated) lies in inexhaustible quantities in Central Germany, near Cologne (where, however, it is inferior), and in Silesia; and for working it needs neither costly plant nor skilled labour. While the black coal output has fallen badly, the brown output has risen, and is still rapidly rising, and there seems no limit to the increase.

After next year, the Coal Commissioner announces, sugar and certain other industries will have to depend entirely on brown coal briquettes, so between the industries which want briquettes for firing, and those which see untold wealth in brown-coal distillation, a struggle is proceeding; and at present companies of all kinds compete on the Berlin Stock Exchange to get hold of the precious mines.

The gasifying of brown coal has taken enormous dimensions. The aim, naturally, is to exploit the by-products. In Lower Silesia are being erected vast brown coal generator stations. The gas will be supplied by pipe to long distances. Despite the fact that the building and equipping of factories costs ten or twelve times as much as in 1914, industrial concerns find it worth while to move to the spot. The secret of this cheapness is the growing output of brown coal oils, as a result of which the gas can almost be given away. In 1916 the Deutsche Erduel Company (which has since been followed by many other companies) began to produce lubricating, and later, illuminating oils from brown coal. This process, which before the war was known to be technically possible, has now proved also commercially profitable. At first it was believed that a possible restoration of the mark exchange, making imports cheaper, would kill this new industry, as it has killed many of the surrogate industries proper. To-day, however, a universal oil shortage is foreseen; even America is taking to shale-oil production; and so the brown coal oil industry has come to stay. The largest company in this branch predicts that within ten years Germany will be entirely independent of foreign oils.

The production of other brown coal tar products is making rapid progress. The Berlin expert, Erwin Bluemmer, estimates that ultimately there will be an annual production of 1,000,000 tons of brown coal tar, yielding (in addition to 40,000 tons of lubricating oils, and unstated amounts of other by-products) 300,000 tons of benzine. In districts where a metal industry exists side by side with brown coal distilling, brown coal gas is being used for firing Martin furnaces. This innovation, says the trade journal, *Eisen und Stahl*, is a great success both technically and from cost standpoint. Even the ashes of brown coal are not wasted. An expert of the Dresden Technical High School, Dr. Luftschitz, is converting them into cement. Mountains of brown coal ash lie around the industrial towns of the west.

Recent Wills

Mr. J. S. Hulton, of Southport, Lancs., formerly of Rochdale, calico printer, &c.	£71,692
Mr. G. M. Elliott, Cheadle Heath, formerly connected with Messrs. Elliott Crabtree, starch manufacturers (net personalty £58,752)	£61,430
Mr. W. H. Hare, of Bradford, dyer, &c.	£23,347
Professor E. Kinch, of Hazlemere, professor of Chemistry, Royal Agricultural College, Cirencester	£21,303
Mr. A. Barron, of Mexborough, Yorks, glass bottle manufacturer, manager to T. Barron, Ltd.	£10,139
Mr. W. T. Siversten, lecturer in pharmacy and materia medica at Swansea Technical School, Secretary of the South Wales and Monmouthshire Pharmaceutical Federation, a native of Norway	£188

Books Received

Practical Chemistry. By N. H. Black and J. B. Conant. New York: The Macmillan Company. Pp. 474. 11s. net.

Report of the Post-War Economic and Industrial Situation of Denmark. London: H.M. Stationery Office. Pp. 38. 4d. net. (Cmd. 955.)

From Week to Week

COLONEL SIR E. A. BROTHERTON has left this country for New York.

GERMAN FERTILISERS and nitrate salts are quoted at twelve times pre-war rates.

PETER BROTHERHOOD, LTD., have removed from 25, Queen Anne's Gate, S.W., to Central House, Kingsway, W.C. 2 (Telephone: Gerrard 6,850).

DR. A. B. MACALLUM, chairman of the Canadian National Council of Industrial and Scientific Research, has been appointed to the new Chair of Bio-Chemistry at McGill University.

DR. HOPE, tutor in chemistry, probationer Fellow of Magdalen College, Oxford, has been admitted actual Fellow of the College.

Unless the BLOOMSBURY SITE offered by the Government to the Senate of London University is accepted by October 20 the offer will be withdrawn.

The death took place on October 1 of ITALO GIGLIOLI, Professor of Agricultural Chemistry in the Royal University of Pisa, Italy.

COURTAULDS, LTD., artificial silk manufacturers, Flint, are presenting to the town a fully-equipped laboratory for the teaching of science in the county.

Mr. T. D. OWEN, metallurgist, has given £10,000 to University College, North Wales, for the foundation of a chair in his name, of electrical engineering and hydroelectrics.

Professor McLennan, who was sent to Canada recently by the British Admiralty, reports that Alberta alone can supply over 10,000,000 cubic ft. of HELIUM annually, and other parts of the Empire another 2,000,000 cubic ft.

During his recent visit to Pretoria, Lord Leverhulme purchased the NATAL SOAP WORKS establishment and interests in Pretoria West, and gave tentative orders for a big extension of the works. The latter will cost at least £25,000.

Damage amounting to several thousand pounds was caused by a fire which broke out from an unknown cause last Saturday at the chemical works of SPENCER, CHAPMAN, & MESSEL, LTD., North Woolwich Road, Stratford.

The annual general meeting of the CHEMICAL INDUSTRY CLUB is arranged to take place on Friday, October 29, at 8 p.m. The annual dinner will be held at the Connaught Rooms on November 19.

The police court investigation into the charge against PHINEAS KEATS, a young Birmingham chemist, of obtaining large sums of money by false pretences, was concluded last week, and the accused, who pleaded not guilty, was committed for trial.

UNDER THE AUSPICES of the Dundee branch of the Amalgamated Society of Pharmacists, Drug & Chemical Workers, a party of chemists' assistants and apprentices visited the Dundee Gas Works, when the whole process of the manufacture of gas and its by-products was explained by the laboratory assistants.

With reference to a note in our last issue on Hopol Powder, the company have forwarded us particulars of experiments and trials with their product which leave no doubt that when mixed with turpentine substitute hopol powder makes quite a satisfactory polish. From the letters submitted it has evidently proved thoroughly satisfactory in practice.

The report of the INTERNATIONAL COMMITTEE ON ATOMIC WEIGHTS for 1920-1921, signed by Professor F. W. Clarke, Sir T. E. Thorpe, and M. G. Urbain, recommends no alterations in the accepted values of the atomic weights except in the case of that of scandium, which should now be changed from 44·1 to 45·1.

JOHN LYSAGHT, LTD., of the Normanby Park Steelworks, was fined £50 and costs (10s.), at Scunthorpe, on Wednesday, for a breach of the Factory Act, by not properly fencing the cogs of certain machinery in the rolling mill. A man named Littlewood had been fatally injured through getting his arm in the cogs.

On Friday, October 1, the Lord Mayor of Leeds (Mr. T. B. Duncan) presented the GALLANT CONDUCT MEDAL of the British Industrial "Safety First" Association to J. H. Tebbs, who, on February 24 last was the means of saving a fellow workman's life at Brotherton's ammonia distillery at Stourton, near Leeds.

MR. ERIC K. RIDEAL, of Trinity Hall, Cambridge, has been elected to a Fellowship. Mr. Rideal obtained a first class in both parts of the Natural Sciences Triposes. He has also obtained the degree of Ph.D. at Bonn University, and D.Sc. at the London University. He is a Fellow of the Institute of Chemists. During the last year he has been acting as Visiting Professor in the University of Illinois, United States.

The PHARMACY CLASS for the training of ex-service men, initiated by the Ministry of Labour, was reopened at the Birmingham Municipal Technical School on Monday. Amongst others taking part in the ceremony were the Lord Mayor (Alderman W. A. Cadbury) and Mr. E. T. Neathercourt (president of the Pharmaceutical Society of Great Britain). The Lord Mayor presented to C. R. A. Pennington a silver medal, and to W. Gough a bronze medal, for work done in the last session.

The seventy-ninth session of the SCHOOL OF PHARMACY was inaugurated on Wednesday, when a large gathering assembled as guests of the Pharmaceutical Society of Great Britain, at the offices at Bloomsbury Square. The president of the society, Mr. E. T. Neathercoat, was in the chair, and among those present were Sir William Glyn Jones (secretary of the society) and Professor Greenish, Dean.

The Senate of Queen's University, Belfast, have decided to found, in association with the Belfast Municipal Technical Institute, a new FACULTY OF APPLIED SCIENCE AND TECHNOLOGY, to deal with such subjects as pure and applied physics, applied chemistry, bleaching and dyeing, and textile industries, &c. Also with such subjects in the Faculties of Arts and Commerce as may be decided.

Mr. L. G. Killby has been appointed secretary to the Empire Cotton Growing Committee. He is at present superintendent of the Department of Technology, City and Guilds of London Institute. In 1904, at Oxford, he took his B.A. degree in the Honours School of National Science, with First Class Honours in Chemistry. He then became Demonstrator in Chemistry, and in 1907 was awarded the degree of B.Sc. (Oxon) for research work. He has been on the Staff of the Department of Technology for 14 years. During the war Mr. Killby received a Commission in the Army, and served in France as one of the chemists on water supplies in the field, and was afterwards transferred to the Chemical Warfare Department of the Ministry of Munitions. He was mentioned in despatches.

At the Manchester County Court on Tuesday, Joseph Reeves, a workman, of Moston Lane, Blackley, claimed COMPENSATION FOR INJURIES from the British Dyestuffs Corporation, Ltd. The case for the plaintiff was that whilst unscrewing the bung of a drum containing mustard gas, the bung struck him in the face and he was gassed. He was away from work for some time, and it was contended that he was suffering from fine tube bronchitis caused by gas poisoning. The defence was that the bronchitis was due to natural causes. Judge Mellor said the opinion of the assessor and himself was that plaintiff's tendency to bronchitis was brought on by mustard gas poisoning. His present condition, however, was not bad, and he ought to have been working long ago. Judgment was given for £1 per week compensation for six months from September 11, 1919, and 7s. a week from that time.

THE INDUSTRIAL BOARD issued on Wednesday their award on the claim made by workers employed in the Manchester chemical trade for "dirt" allowance. The award is as follows: "An allowance of 1s. a day (two hours to constitute a day) shall be paid to all workmen when employed on jobs which, on account of the character of the work itself or the surroundings in which it is done, are dangerous to health or involve damage to or exceptional wear and tear of the workman's clothing or boots." This award takes effect as from the beginning of the first pay period following October 5. The firms concerned are: Anchor Chemical Co., Ltd., British Dyestuffs Corporation, Courtaulds, Ltd., Clayton Aniline Co., Ltd., Hardman & Holden, Ltd., Horrocks & Sons, Ltd., J. E. C. Lord, Weaste, Manchester Oxide Co., Ltd., Morris & Co., Ltd., Spence & Sons, Ltd., C. J. Schofield, Ltd., Tennants (Lancashire), Ltd.

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ALKALI FUSIONS. Fusion of sodium benzene *m*-disulfonate with sodium hydroxide for the production of resorcinol. Max Phillips and H. D. Gibbs. *J. Ind. Eng. Chem.*, September, 1920, pp. 857-860.

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Starch and Glucose Industry in Canada

UNDER the direction of the Chief of the Mining, Metallurgical and Chemical Division of the Canadian Dominion Bureau of Statistics, S. J. Cook, B.A., A.I.C., an account of the chemicals and allied products in Canada has been compiled. Below we publish extracts of an advance chapter on the "Starch and Glucose Industry in Canada."

Corn oil is made by pressing the germ of the common Indian corn. By refining and deodorising it with superheated steam, an edible product may be obtained. This grade of oil is used in cake and biscuit making and for oiling baker's pans. It is also used in the manufacture of oleomargarine and as a salad oil. Hydrogenated corn oil is a satisfactory stiffening agent for lard substitutes, and is extensively used, too, in soap making. Although the output is not large, it is finding a ready market, and the probability is that the production and consumption of corn oil will be greatly increased within the next few years.

The following table gives the quantities and value of materials imported in 1918, which are of interest in connection with the starch and glucose industry :—

	lbs.	$
Corn, Indian, not for purposes of distillation	609,752,136 ...	16,709,904
Potatoes, n.o.p.	40,950,180 ...	705,281
Starch, including corn starch, potato starch, potato flour, and all preparations having the qualities of starch ...	2,434,281 ...	144,125
Glucose or grape sugar, glucose syrup, and corn syrup, or any syrups containing any mixture thereof	2,852,516 ...	169,362
		17,728,672

The consumption of starch of all kinds in Canada was 22,842,582 lbs. in 1918. All the potato starch was produced in seven plants, in which this commodity was the only product. Three establishments made corn starch from corn and produced corn oil as a by-product. One firm made only Chinese starch, while another dextrine exclusively.

Chair of Industrial Medicine

AN appeal is being made by the governors of St. Mary's Hospital to the heads of industry for £50,000, with which to endow a chair of industrial medicine at the hospital. At a luncheon last week of the medical staff and lecturers the chairman, Mr. T. M. Taylor, said it was a singular fact, but in this essentially industrial country there was not a single chair of industrial medicine, not a place where all the information obtained could be scientifically collated and co-ordinated. America had six such chairs, and the results were a glowing tribute to the value of the work undertaken. The statistics of recruiting during the war showed that of all the great nations involved in hostilities there was a greater number of medically unfit in this country than in any other. The unfitness was in a large measure due to the occupational diseases found in almost every industry.

Patent Literature

Abstracts of Complete Specifications

150,360. ACETONE AND BUTYL ALCOHOL, FERMENTATION PROCESSES FOR THE PRODUCTION OF. C. Weizmann, 67, Addison Road, London, W. 14. Application date, May 25, 1917.

The process is for producing acetone and butyl alcohol by the bacteriological decomposition of starchy carbohydrates as described in Patent No. 4,845/1915. When this process is applied to nuts or other fruits containing saponins or similar substances, considerable frothing takes place during fermentation. To avoid this, about 5 to 6 per cent. of malt is added, which thins the mixture to an extent sufficient to prevent frothing.

150,401. ALLYL ESTER OF 2-PHENYLQUINOLINE-4-CARBOXYLIC ACID, MANUFACTURE OF. O. Imray, London. (From Society of Chemical Industry in Basle, Switzerland.) Application date, May 28, 1919.

The object is to produce allyl esters of 2-phenylquinoline-4-carboxylic acid, which possess advantages over the alkyl esters for medicinal purposes. Sodium 2-phenylquinoline-4-carboxylate is dissolved in acetone, heating to boiling in a reflux apparatus, and allyl bromide or chloride added. After the reaction is complete, acetone and the allylating agent are distilled off, the residue dissolved in ether, and the solution washed with sodium carbonate, water, and then dried. Other examples are also given.

150,412. AROMATIC NITRO-COMPOUNDS, PROCESS FOR REDUCING. J. Tcherniac, 49, Palace Road, Streatham Hill, London, S.W. 2, and S. H. Davies, Ryecroft, New Earswick, York. Application date, May 29, 1919.

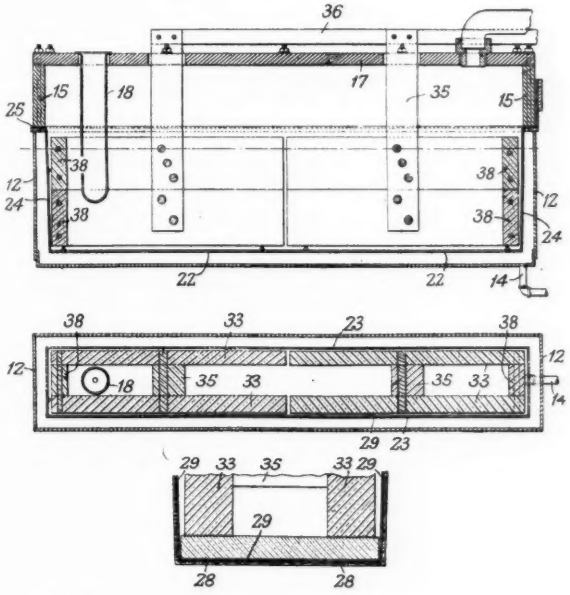
The process is more particularly for reducing aromatic oxy-nitro compounds by treatment with hydriodic acid in presence of hydrochloric acid. Para-nitro-phenol is mixed with amorphous phosphorus, iodine, and hydrochloric acid of 20 per cent. strength, and heated in a reflux apparatus. The reaction continues without external heat, but the mixture is finally boiled until iodine vapour appears. The phosphorus in the presence of water converts iodine into hydriodic acid and the iodine is again liberated by the oxidising action of the nitro compound, so that the consumption of iodine is reduced to a minimum. The mixture is allowed to crystallise by cooling, filtered and the crystals washed with hydrochloric acid.

150,589. VERTICAL RETORTS OR OVENS, INTRODUCTION OF STEAM INTO. Woodall, Duckham & Jones, Ltd., and Sir A. M. Duckham, 231/2, Strand, London, W.C. 2. Application date, December 18, 1919.

When coal is carbonized in a retort heated externally and steam then passed through the hot coke, water gas is produced but the amount is limited by the endothermic action which occurs in its production. In this invention the steam is superheated above 700°F. by passing it through tubes adjacent to the waste gas flues which may be at a temperature of 1800°F. to 2200°F. The highly superheated steam passes through openings in the walls of one of the heated tubes directly into the retort.

150,595. ELECTROLYTIC CELLS. W. J. Mellersh-Jackson, London. (From Allen Electrolytic Cell Corporation, 534, Congress Street, Portland, Me., U.S.A.) Application date January 5, 1920.

The electrolytic cell is for producing caustic soda from brine. An iron or steel tank, 12, is provided with an upper portion 15, of slate, concrete, or other inert material, and is closed by a cover 17, of similar material. The cathode consists of an iron box having a bottom 22, sides 23, and ends 24, spaced slightly from the tank walls, all its walls being provided with closely-spaced perforations. The cathode is supported from the tank by means of flanges 25. Strips of porous asbestos paper 28, 29, are placed over the inner surface of the cathode with a double layer on the bottom. The anode is arranged within the cathode and consists of carbon plates 33, and 38, closely spaced from the walls of the cathode and connected to upright carbon bars 35, which project through the cover and are connected to an electric conductor 36. The sodium chloride solution is fed continuously into the tube, 18, from which it passes by the opening, 43, into the anode compartment and then percolates through the porous diaphragm to the cathode. The caustic soda and undecomposed chloride drop into the bottom of the



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tank and are drawn off by the discharge pipe, 14. The apparatus gives a large active electrode surface, but the exterior walls of the cathode are not submerged in the electrolyte. The cathode anode porous diaphragm and upper part of the cell 15 merely rest on the rim of the tank, 12, and are removable bodily.

Note.—The following specifications which are now accepted were abstracted in THE CHEMICAL AGE when they became open to inspection under the International Convention:—132,490 (F. O. A. Rousseau), relating to production of hydrocarbon liquids from carbonaceous material (*See* Vol. I., p. 604); 136,151 (Electrolytic Zinc Co.), relating to recovery of zinc by electrolysis (*See* Vol. II., p. 184); 137,519 (Fabriques de Produits Chimiques de Thann et de Mulhouse), relating to potassium sulphate (*See* Vol. II., p. 311); 138,600 (International Nickel Co.), relating to nickel and copper (*See* Vol. II., p. 414).

International Specifications Not yet Accepted

147,030. MANGANESE DIOXIDE. E. H. Westling, 948, Post Street, San Francisco, Cal., U.S.A. International Convention date, March 14, 1918.

Powdered ore containing an oxide of manganese is suspended in water or manganese sulphate or dithionate solution contained in three towers, and sulphur dioxide is passed through in series. The first tower is kept above 60°C., and manganese sulphate is formed in it, while sulphate and dithionate are formed in the other two towers, which are kept at a lower temperature. Hot air is then passed through to expel sulphur dioxide and oxidise any iron in solution, and the contents of the first tower are then treated with lime to precipitate iron, aluminium and phosphorus, which are separated. Calcium nitrate is then added to convert the manganese sulphate into nitrate, and the resulting calcium sulphate is filtered off. Manganese dioxide is obtained from the nitrate. The contents of the second and third towers are transferred to the first and second respectively, while water and a fresh charge of ore are placed in the third tower, and the operations are then repeated

147,044-5. TREATING WASTE WASH WATERS. Soc. Generale d'Evaporation Procédés Prache et Bouillon (formerly Soc. d'Exploitation de Procédés Evaporatoires Systeme Prache et Bouillon), 25, Rue de la Pepiniere, Paris. International Convention dates, March 9 and March 3, 1914.

147,044. Water from wool-washing which contains grease is concentrated at a temperature above the melting point of the grease by the use of the steam from the evaporator after it has been compressed. The grease is then removed by centrifuging. Soap, which remains in the liquor, is converted into alkali carbonates by treating with carbon dioxide, separating the fatty acids, concentrating, and calcining. If soda was originally used for washing instead of soap, the treatment with carbon dioxide is omitted.

147,045. The soapy water is treated with carbon dioxide to produce fatty acid, and carbonate or bicarbonate of the base of the soap and of mineral salts in solution.

147,051. COKE-OVEN GASES, TREATING. Rombacher Hüttenwerke, 6, Rheinzollstrasse, Coblenz, Germany. (Assignees of J. Bronn, 62, Bismarkstrasse, Charlottenburg, Berlin.) International Convention date, November 21, 1914. Addition to 146,839. (See THE CHEMICAL AGE, Vol. III., page 381.)

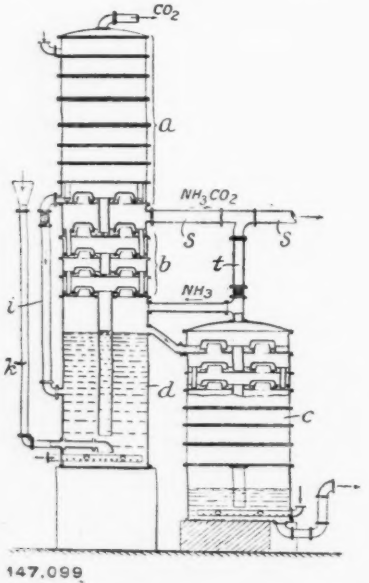
The gases are first treated for the removal of by-products and carbon dioxide, and are then compressed to 30 atmospheres pressure at a temperature of—150°C. Ethylene, methane, and carbon monoxide are liquefied and separated, and the liquid gives a gas suitable for lighting or heating. The gaseous mixture of nitrogen and hydrogen may be used for the synthesis of ammonia. The carbon monoxide may be separated from the liquefied gas by fractional evaporation.

147,094. SULPHURIC ACID. R. Forster & Co., 89, Lutzowstrasse, Berlin. International Convention date, June 24, 1918.

The sulphur bearing material from which sulphur dioxide is obtained by burning is mixed with calcium nitrate, so that the heat of the reaction is used to decompose the nitrate and yield the oxides of nitrogen required in the manufacture of sulphuric acid.

147,099. AMMONIA. Firm of C. Still, Recklinghausen, Westphalia, Germany. International Convention date, December 6, 1915.

Ammonical gas liquor is passed downwards through a column *a*, and a portion passes on through a column *b* to a



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liming vessel *d*; the remainder passes direct to the liming vessel through the pipe *i*. Liquor from the vessel *d* passes downwards through the column *c*, and steam is passed upwards through the column *c* and the vessel *d* and column *b* to expel carbon dioxide which is partly drawn off through the pipe *s* with steam and ammonia, and partly passes into the column *a* to expel carbon dioxide free from ammonia. The flow through the pipe *i* is regulated so as to regulate the amount of carbon dioxide passing off by the pipe *s* to the condenser and prevent formation of ammonium carbonate.

147,067. ORGANIC NITROGEN COMPOUNDS. Chemische Fabrik Rhenania Akt.-Ges. and B. C. Stuer, Aachen, and W. Grob, Stolberg, Rhine, Germany. International Convention date, November 20, 1913.

Acetonitrile and pyrrol are obtained by passing mixtures of acetylene and ammonia with or without steam, over bauxite, bog-iron ore, or chrome-iron ore at 350°C. If the temperature is raised to 550°C. the proportion of pyrrol is increased.

147,101. PYRIDINE BASES. Farbwerke vorm. Meister, Lucius, and Bruning, Hoechst-on-Main, Germany. International Convention date, December 23, 1918. Addition to 146,869. (See THE CHEMICAL AGE, Vol. III., page 381.)

Aqueous ammonia is heated wirh paraldehyde and formaldehyde or acetone instead of with paraldehyde alone as in 146,869. When formaldehyde is used, methylpyridines are produced in addition to 2-methyl-5-ethylpyridine, and when acetone is used, symmetrical trimethylpyridine is the main product.

147,117. CARBONISING FUEL. P. Meyer, 29, Spoorsingel, Delft, Holland. International Convention date, June 29, 1918.

Fuel is fed downwards through a vertical retort having a contracted part near the middle. Gas is withdrawn at the top, passed through a condenser, and injected into the lower end of the retort. The gas is again withdrawn just below the contracted part, heated to the carbonising temperature and reintroduced just above the contracted portion to carbonise the charge.

147,118. HYDROGENATION. N. Grunstein, 21, Hansa-Allee, Frankfurt-on-Main, Germany. International Convention date, January 4, 1919.

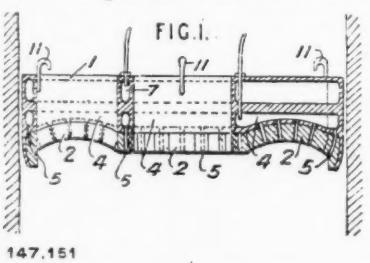
Crotonic aldehyde, or the product of decomposition of aldol after removing acetaldehyde, is catalytically hydrogenated to butyric aldehyde and butyl alcohol in the presence of water or steam, the hydrogen being in excess to remove other decomposition products which are simultaneously produced.

147,119. ALDOL. N. Grunstein, 21, Hansa-Allee, Frankfurt-on-Main, Germany. International Convention date, March 18, 1919.

Acetaldehyde is neutralised with aqueous alkali and then treated with an alkaline condensing agent such as solid, dissolved, or suspended caustic alkali, alkaline earth oxides, hydroxides, cyanides, or carbides, to produce aldol. Oxidation of the aldehyde to acetic acid is prevented by effecting the reaction in an atmosphere of nitrogen.

147,151. SHAFT FURNACES. C. Schneider, Korkwitzerweg, Ribnitz, Mecklenburg, Germany. International Convention date, March 15, 1918.

A shaft furnace is provided with a movable arch 1 resting



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on the charge and composed of two rings connected by radial webs. Air or gaseous fuel is passed through channels 4 to preheat it, and delivered to the charge through openings 5 in the refractory lining 2. The arch is lifted by hooks 11 when more

material is to be fed to the furnace. Cooling water is circulated through the channels 7. Modified constructions are also described.

147,173. PHENOL-ALDEHYDE CONDENSATION PRODUCTS. J. Filhol, 60, Rue Moliere, Lyons, France. International Convention date, June 26, 1919.

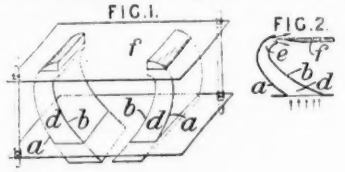
Phenol is condensed with formaldehyde in the presence of ammonium carbonate or phenate as catalyst, and the product heated to 75-80°C.till viscous. The product is mixed with ethyl hydrogen sulphate and converted into the final insoluble and infusible product at ordinary temperature. If the ethyl hydrogen sulphate is mixed with alcohol, the product is a varnish. The intermediate condensation product may be acetylated.

147,184. WASTE LIQUORS CONTAINING SOAP, TREATING. Dorr Co., 101, Park Avenue, Manhattan, New York. (Assignees of C. L. Peck, 249, Bedford Avenue, Mount Vernon, N.Y., U.S.A.) International Convention date, July 1, 1919.

The liquor is treated with calcium chloride and agitated by blowing gas through it, when a froth forms and is separated. Water is then removed by filtration and the product treated for the recovery of fatty matter.

147,189. CENTRIFUGAL SEPARATORS. E. Mazza, 5, Via Biamonti, Turin, Italy. International Convention date, September 7, 1915.

A mixture of gases is forced through curved conduits *d* and is thereby separated centrifugally into two layers in con-



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tact with the walls *a*, *b*. The layers are separated by a plate *f* between the outlets of the two conduits against which the gases impinge as shown in the illustration.

147,196. WASTE LIQUIDS, RECOVERING ORGANIC MATTER FROM. Dorr Co., 101, Park Avenue, Manhattan, New York. (Assignees of C. L. Peck, 249, Bedford Avenue, Mount Vernon, N.Y., U.S.A.) International Convention date, July 1, 1919.

The process is applicable to the treatment of waste liquors containing casein, fat, butter, cheese, soap, waxes, resin, gum, rubber, vegetable or mineral oils or tars, and liquors from the treatment of hides, wool, silk, &c. Air or carbon dioxide is forced through the liquor and the matter to which the gas adheres is separated by floating. Soap or oil may be added when the organic matter has no natural attraction for the gas.

147,229; 147,230-1. COKE OVENS. J. C. Baron von Haersolte van Haerst, Driebergen, Holland. (Assignee of W. Hiby, 76, Oude Zeeweg, Noordwijk aan Zee, Holland, and Dr. C. Otto & Co., Ges. Dahlhausen-on-Ruhr, Germany.) International Convention dates, July 14, August 15, and January 3, 1916.

147,229. A coke oven with vertical flues is heated either by rich or poor gas, and the gas and air are preheated by recuperator and regenerator units in connection with each heating flue.

147,230. A coke oven with vertical flues has the flues connected in pairs, and regenators are provided running longitudinally below the ovens. Air is always admitted to the regenerators at one side of the bench, and waste gases drawn off to the main flue on the other side.

147,231. A coke oven with vertical flues has foundation tunnels to give access to the burner-regulating valves, and also to the dampers of regenerator chambers which are connected with each heating flue.

147,232. TREATING CELLULOSE-CONTAINING MATERIALS. Zellstoff-fabrik Waldhof, Mannheim, Germany. International Convention date, October 19, 1916.

When treating wood or the like under pressure with alkalies, acids, or salts, the deleterious effect due to high temperatures is avoided by applying the pressure independently of the temperature by forcing compressed air into the apparatus.

LATEST NOTIFICATIONS.

151,583. Cyanamide from calcium cyanamide. Wargons Aktiebolag. September 19, 1919.

151,596 Conversion of cyanamide into urea. Soc. d'Etudes Chimiques pour l'Industrie. September 26, 1919.

151,597. Manufacture of a mixed manure containing a variable amount of nitrogen and phosphate. Soc. d'Etudes Chimiques pour l'Industrie. September 26, 1919.

151,598. Manufacture of a mixed manure containing a variable amount of nitrogen and phosphates. Soc. d'Etudes Chimiques pour l'Industrie. September 26, 1919.

151,605. Process of and apparatus for feeding glass. Miller, W. J. September 23, 1919.

151,605. Apparatus for manufacturing glass articles. Miller, W. J. September 23, 1919.

Compulsory Licenses

THE British Dyestuffs Corporation, Ltd., 70, Spring Gardens, Manchester, have now withdrawn the applications which they had made for compulsory licences, under Sect. 27 of the Patents and Designs Act, in respect of Patents 5,122/1907, 6,490/1907, 344/1908, and 3,373/1908. Particulars of these patents, which relate to the manufacture of dyestuffs, were given in THE CHEMICAL AGE, Vol. III., pages 70 and 189.

Specifications Accepted, with Date of Application

14,267/14. Ores of certain metals, Process for the treatment of. R. D. Lance. April 15, 1914.

128,578. Chlorhydrins, bromhydrins, or olefinic hydrocarbons, Manufacture of. Commercial Research Co. June 20, 1918.

133,319. Zinc chloride, Manufacture of. C. P. Burgess Laboratories. September 26, 1918.

135,847. Calcium cyanamide, Process of granulating—to render it suitable for use as a fertiliser. P. M. T. Saves. November 26, 1918.

151,024. Fertilisers. J. R. Partington and L. H. Parker. June 26, 1918.

151,031. Furnace walls. E. Bernitz. March 12, 1919. (Addition to 119,599.)

151,072. Pulverising apparatus. J. Aube. June 12, 1919.

151,086. Acetaldehyde, Production of. M. Soller, J. L. R. Hotz, and British Cellulose and Chemical Manufacturing Co. June 14, 1919.

151,092. Steel, Process of making. G. L. Fisk. June 17, 1919.

151,098. Cyanides, Production of. C. T. Thorssell and H. L. R. Lunden. June 20, 1919.

151,173. Stamping, crushing or like machines. H. F. Adams, October 20, 1919.

Applications for Patents.

Amalgamated Zinc (De Bavay's), Ltd. Recovery of lead and silver from sulphide ores and metallurgical products. 28,015. October 2. (Australia, October 3, 1919.)

Bearder, E. A. Manufacture of cellulose acetates for production of artificial silk, films, celluloid, &c. 27,973. October 2.

Bourcoud, A. E. Reducing metallic oxides. 27,493. September 27. (United States, June 17, 1918.)

British Cellulose & Chemical Manufacturing Co. Treatment of products made with cellulose derivatives. 27,534. September 28.

Bustamante, G. J. Process of obtaining cellulose from vegetable matter. 27,904. October 1.

Carpmael, W. (*Farbenfabriken vorm. F. Bayer & Co.*). Manufacture of mordants and process of dyeing basic dye-stuffs on cotton. 27,466. September 27.

Dreyfus, H. Manufacture of alkyl compounds. 27,646. September 29.

Dumont, J. Manufacture of combined phospho-organic manure. 28,001. October 2.

Glover, S. Means for separation of liquor from tar and oils. 27,999. October 2.

Goldschmidt Akt.-Ges., T. Alumino-thermic production of carbon-free ferro-chromium, &c., from chrome-iron ore. 27,659. September 29. (Germany, October 14, 1919.)

Imray, G. (*Soc. of Chemical Industry in Basle*). Manufacture of new dye-stuffs. 28,008. October 2.

Kelly, A. Manufacture of acid sodium pyrophosphate. 27,660. September 29.

Maxted, E. B. Absorption of ethylenic hydro-carbons. 27,621. September 29.

Norsk Hydro-Elektrisk Kvælstofaktieselskab. Catalyzer for manufacture of ammonia, and process of producing same. 27,491. September 27. (Norway, October 28, 1919.)

Richardson, L. G. Treatment of products made with cellulose derivatives. 27,534. September 28.

Schwartz, C. H. Manufacture of cellulose acetates for production of artificial silk, films, celluloid, &c. 27,973. October 2.

Monthly Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

British Market Report

THURSDAY, October 7.

There has been a slightly better inquiry in certain products during the last week, but it is difficult to say that there has, as yet, been any definite improvement in trade conditions. The export markets continue to be affected by the unfortunate exchange situation.

General Chemicals

ACETONE is firm in tone, although prices are as yet unchanged. There has been considerable inquiry for export.

ACID ACETIC.—Stocks are passing steadily into consumption at recent prices.

ACID CARBOLIC is only a nominal market, owing to the export difficulties. Stocks are only moving slowly.

ACID CITRIC.—Unchanged.

ACID FORMIC is firmer in tone and only limited quantities are available.

ACID OXALIC is inclined to be firmer in sympathy with small imports.

ACID TARTARIC.—There is no change in price, but stocks are being steadily liquidated.

BLEACHING POWDER is scarce on export account. Makers are conserving their stocks to ensure adequate supplies for home consumption.

COPPER SULPHATE.—The better tone is maintained although it is still difficult to negotiate important export orders.

FORMALDEHYDE remains a secondhand market, but as previously indicated, an improvement in price is quite probable. Certain low prices obtained on realisation of stocks do not appear to be justified by the actual first-hand position.

LEAD SALTS is an easier market and low price offers are reported from abroad.

POTASSIUM PRUSSIATE is decidedly firmer.

SODA CAUSTIC is still offered in secondhands, no doubt owing to cancellation of foreign orders.

SODA BICHROMATE.—The market is easy, but the total quantity offered is not large. Improvement in the export demand would in all probability immediately react on prices.

SODA NITRITE.—Unchanged in price, but only in slow demand.

SODA PHOSPHATE.—Secondhands offer below the makers' prices, but the undertone is firm.

SODA PRUSSIATE.—The English makers have effected considerable sales and the price has been advanced slightly on forward account. Makers report nothing available for immediate delivery.

ZINC SALTS show little movement.

Coal Tar Intermediates

There is very little to report since our last issue. Markets still continue on the slow side, but there are relatively few changes in price to report.

ALPHA NAPHTHOL is only in moderate request and price is without change.

BETA NAPHTHOL is without feature, and is inclined to be easier in the face of cheaper foreign offers.

DIPHENYLAMINE is still wanted, but is not easy to obtain for near delivery.

PARANITRANILINE is scarce, and is without change in price.

RESORCIN.—Quite a fair business has been done in the technical material, but supplies are only light.

SALICYLIC ACID is in very moderate request, and price is inclined to be easier.

Coal Tar Products

There is no change to report in our market.

90's BENZOL is still scarce and quoted 3s. 10d. to 3s. 11d. in the North, with 4s. 1d. in the South.

PURE BENZOL is worth 4s. 3d. per gallon.

CREOSOTE OIL remains unchanged at 1s. 1d. to 1s. 1½d. in the North and 1s. 2d. to 1s. 2½d. in the South.

CRESYLIC ACID is slightly more active and prices are 3s. 10d. to 4s. 0d. for Dark, 95/97 per cent., with 4s. 6d. to 4s. 9d. for Pale 97/99 per cent.

SOLVENT NAPHTHA is slightly firmer and is quoted 3s. 2d. on rails.

HEAVY NAPHTHA remains unchanged at 3s. 6d. per gallon.

NAPHTHALENE is somewhat freer. Crude qualities are selling from £14 to £24 per ton. Refined is distinctly weaker, and is not worth more than £50 a ton.

PITCH.—The market remains firm, but the demand from abroad has eased off somewhat. Prices are unchanged.

Sulphate of Ammonia

There are no new features to report.

French Market Report

There has been little feature in this market. Such transactions as there have been are of very small dimensions and are mainly realisations of merchants' stocks.

More works are beginning to go into operation, and the industry begins to show signs of settling down.

ACID ACETIC is standing at about 500 francs per hundred kilos for 80 per cent. technical.

ACID BORACIC is standing at about 450 francs.

ACID OXALIC is in good supply at 1,550 francs.

ACID TARTARIC is in plentiful supply at 18 francs per kilo.

ALUM is in small demand at 145 francs.

LEAD ACETATE is quoted at 470 francs.

POTASH PERMANGANATE is in slow demand at 1,000 francs per 100 kilos.

POTASH PERMANGANATE is quoted at 28 francs per kilo.

POTASH PRUSSIATE at about 1,250 francs per 100 kilos.

SODIUM BICHROMATE is easy at 700 francs per 100 kilos.

SODIUM PRUSSIATE is quoted at 925 francs.

SODIUM CAUSTIC is slow of sale at 145 francs per 100 kilos.

German Market Report

It is very difficult to make a proper estimate of the present condition of the German market. A very great deal depends on the course of the exchanges. If anything, there is a slight increase in the trade being done, but on the other hand, quite a number of works have more materials for disposal and are inclined to concentrate themselves on the export trade, in view of the better prices to be obtained.

ACID OXALIC is quoted at about 40 marks.

ALUM is only in moderate request and is standing at 3.50 marks per kilo.

AMMONIUM CARBONATE is in very light demand and is offered at about 7 marks per kilo.

ARSENIC is in good demand and apparently very scarce. The price would appear to be about 16 marks.

COPPER SULPHATE is plentiful and easy at about 6 marks.

LEAD PRODUCTS are all on the easy side, and sellers are inclined to make concessions.

LITHOPONE is standing at about 8 marks.

POTASSIUM PERMANGANATE is slow of sale at 52 marks.

SODIUM SULPHIDE concentrated is standing at about 9 marks.

SODIUM HYPOSULPHITE is inclined to be easier at 5.50 marks.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	3	9	to	0	4	0
Acetone oil	ton	90	0	0	to	95	0	0
Acetone, pure	ton	120	0	0	to	125	0	0
Acid, Acetic, glacial, 99-100%	ton	105	0	0	to	110	0	0
Acetic, 80% pure	ton	82	10	0	to	85	0	0
Arsenic	ton	100	0	0	to	105	0	0
Boric, cryst.	ton	74	10	0	to	76	0	0
Carbolic, cryst. 39-40%	lb.	0	0	11½	to	0	1	0
Citric	lb.	0	4	3	to	0	4	6
Fluoric	lb.	0	0	7½	to	0	0	8
Formic, 80%	ton	115	0	0	to	120	0	0

	per	£	s.	d.		£	s.	d.
Gallic, pure	lb.		7	3	to	0	7	6
Hydrofluoric	lb.	0	0	8½	to	0	0	9
Lactic, 50 vol.	ton	58	0	0	to	60	0	0
Lactic, 60 vol.	ton	67	10	0	to	70	0	0
Nitric, 80 Tw.	ton	41	0	0	to	44	0	0
Oxalic	lb.	0	2	3	to	0	2	4
Phosphoric, 1.5	ton	65	0	0	to	67	0	0
Pyrogallic, cryst	lb.	0	11	6	to	0	11	9
Salicylic, Technical	lb.	0	2	3	to	0	2	6
Salicylic, B.P.	lb.	0	2	11	to	0	3	0
Sulphuric, 92-93%	ton	8	10	0	to	8	15	0
Tannic, commercial	lb.	0	3	6	to	0	3	9
Tartaric	lb.	0	3	0	to	0	3	1
Alum, lump	ton	19	10	0	to	20	0	0
Alum, chrome	ton	88	0	0	to	90	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	17	10	0	to	18	10	0
Aluminium, sulphate, 17-18%	ton	20	10	0	to	21	10	0
Ammonia, anhydrous	lb.	0	2	2	to	0	2	4
Ammonia, .880	ton	43	0	0	to	45	0	0
Ammonia, .920	ton	30	0	0	to	32	10	0
Ammonia, carbonate	lb.	0	0	7½	to		—	
Ammonia, chloride	ton	95	0	0	to	100	0	0
Ammonia, muriate (galvanisers)	ton	60	0	0	to	65	0	0
Ammonia, nitrate	ton	55	0	0	to	60	0	0
Ammonia, phosphate	ton	120	0	0	to	125	0	0
Ammonia, sulphocyanide	lb.	0	3	0	to	0	3	3
Amyl acetate	ton	420	0	0	to	425	0	0
Arsenic, white, powdered	ton	76	0	0	to	78	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0
Barium, chlorate	lb.	0	0	11	to	0	1	0
Chloride	ton	28	0	0	to	29	0	0
Nitrate	ton	55	0	0	to	56	0	0
Barium Sulphate, blanc fixe, dry	ton	30	0	0	to	31	0	0
Sulphate, blanc fixe, pulp	ton	16	10	0	to	17	0	0
Sulphocyanide, 95%	lb.	0	1	6	to	0	1	8
Bleaching powder, 35-37%	ton	31	0	0	to	32	0	0
Borax crystals	ton	41	0	0	to	42	10	0
Calcium acetate, Brown	ton	20	0	0	to	21	0	0
,, Grey	ton	34	0	0	to	35	10	0
Calcium Carbide	ton	30	0	0	to	32	0	0
Chloride	ton	10	10	0	to	11	10	0
Carbon bisulphide	ton	65	0	0	to	67	0	0
Casein, technical	ton	75	0	0	to	80	0	0
Cerium oxalate	lb.	0	3	9	to	0	4	0
Chromium acetate	lb.	0	1	2	to	0	1	4
Cobalt acetate	lb.	0	8	6	to	0	9	0
Oxide, black	lb.	0	10	0	to	0	10	3
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	42	0	0	to	44	0	0
Cream Tartar, 98-100%	ton	245	0	0	to	250	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol.	ton	305	0	0	to	310	0	0
Formusol (Rongalite)	lb.	0	4	9	to	0	5	1
Glauber salts	ton		Nominal.					
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	9	to	0	2	10
Iron perchloride	ton	50	0	0	to	52	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	82	10	0	to	85	0	0
Carbonate (White Lead)	ton	65	0	0	to	67	10	0
Nitrate	ton	65	0	0	to	67	0	0
Litharge	ton	57	0	0	to	59	0	0
Lithopone, 30%	ton	48	0	0	to	49	0	0
Magnesium chloride	ton	15	10	0	to	16	10	0
Carbonate, light	cwt	2	15	0	to	3	0	0
Sulphate (Epsom salts commercial)	ton	12	10	0	to	13	0	0
Sulphate (Druggists')	ton	18	10	0	to	19	10	0
Manganese, Borate	ton	190	0	0	to		—	
Sulphate	ton	130	0	0	to	135	0	0
Methyl acetone	ton	95	0	0	to	100	0	0
Alcohol, 1% acetone	gall.		Nominal.					
Nickel sulphate, single salt	ton	60	0	0	to	62	0	0
Nickel ammonium sulphate, double salt	ton	62	0	0	to	64	0	0
Potassium bichromate	lb.	0	1	8	to	0	1	9
Carbonate, 90%	ton	115	0	0	to	120	0	0
Chloride	ton	50	0	0	to	52	0	0
Chlorate	lb.	0	0	9½	to	0	0	10½
Meta bisulphite, 50-52%	ton	260	0	0	to	270	0	0
Nitrate, refined	ton	65	0	0	to	67	0	0
Permanganate	lb.	0	4	3	to	0	4	6
Prussiate, red	lb.	0	4	0	to	0	4	3
Prussiate, yellow	lb.	0	2	0	to	0	2	1
Sulphate, 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt.	5	10	0	to		—	
Seconds	cwt.	5	5	0	to		—	
Sodium acetate	ton	55	0	0	to	56	0	0

	per	£	s.	d.		£	s.	d.
Arsenate, 45%	ton	60	0	0	to	62	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	1	4	to	0	1	5
Bisulphite, 60-62%	ton	50	0	0	to	52	10	0
Chlorate	lb.	0	0	5½	to	0	0	5½
Caustic, 70%	ton	32	0	0	to	33	0	0
Caustic, 76%	ton	34	10	0	to	35	0	0
Hydrosulphite, powder, 85%	lb.	0	4	6	to	0	4	10
Hyposulphite, commercial	ton	35	10	0	to	37	10	0
Nitrite, 96-98%	ton	87	10	0	to	90	0	0
Phosphate, crystal	ton	47	0	0	to	49	0	0
Perborate	lb.	0	2	2	to	0	2	4
Prussiate	lb.	0	1	2½	to	0	1	3½
Sulphide, crystals	ton	30	0	0	to	32	0	0
Sulphide, solid, 60-62%	ton	52	10	0	to	55	0	0
Sulphite, cryst.	ton	15	10	0	to	16	10	0
Strontium carbonate	ton	85	0	0	to	90	0	0
Nitrate	ton	90	0	0	to	95	0	0
Sulphate, white	ton	8	10	0	to	10	0	0
Sulphur chloride	ton	42	0	0	to	44	10	0
Sulphur, Flowers	ton	19	0	0	to	19	10	0
Roll	ton	19	0	0	to	19	10	0
Tartar emetic	lb.	0	3	0	to	0	3	2
Tin perchloride, 33%	lb.	0	2	6	to	0	2	7
Perchloride, solid	lb.	0	3	0	to	0	3	3
Protochloride (tin crystals)	lb	0	2	0	to	0	2	1
Zinc chloride, 102 Tw.	ton	22	0	0	to	23	10	0
Chloride, solid, 96-98%	ton	60	0	0	to	65	0	0
Oxide, 99%	ton	72	10	0	to	75	0	0
Oxide, 94-95%	ton	60	0	0	to	62	10	0
Dust, 90%	ton	90	0	0	to	92	10	0
Sulphate	ton	21	10	0	to	23	10	0

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	4	0	to	0	4	3
Alphanaphthol, refined	lb.	0	5	6	to	0	5	9
Alphanaphthylamine	lb.	0	3	9	to	0	4	0
Aniline oil, drums extra	lb.	0	1	8	to	0	1	9
Aniline salts	lb.	0	1	10	to	0	2	0
Anthracene, 85-90%	lb.		—		to		—	
Benzaldehyde (free of chlorine)	lb.	0	5	9	to	0	6	0
Benzidine, base	lb.	0	13	6	to	0	14	0
Benzidine, sulphate	lb.	0	10	6	to	0	11	0
Benzoic acid	lb.	0	5	3	to	0	5	6
Benzoate of soda	lb.	0	5	3	to	0	5	6
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	1	6	0	to	1	7	6
Betanaphthol	lb.	0	4	9	to	0	5	0
Betanaphthylamine, technical	lb.	0	11	6	to	0	12	6
Croceine Acid, 100% basis	lb	0	5	0	to	0	6	3
Dichlorbenzol	lb.	0	0	6	to	0	0	7
Diethylaniline	lb.	0	7	9	to	0	8	6
Dinitrobenzol	lb.	0	1	4	to	0	1	5
Dinitrochlorbenzol	lb.	0	1	5	to	0	1	6
Dinitronaphthaline	lb.	0	1	6	to	0	1	8
Dinitrotoluol	lb.	0	1	8	to	0	1	9
Dinitrophenol	lb.	0	2	9	to	0	3	0
Dimethylaniline	lb.	0	5	9	to	0	6	0
Diphenylamine	lb.	0	5	0	to	0	5	3
H-Acid	lb.	0	14	6	to	0	15	0
Metaphenylenediamine	lb.	0	5	9	to	0	6	0
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	7	6	to	0	8	6
Monosulphonic Acid (2:7)	lb.	0	7	6	to	0	8	0
Naphthionic acid, crude	lb.	0	5	6	to	0	6	0
Naphthionate of Soda	lb.	0	6	0	to	0	6	3
Naphthylamin-di-sulphonic-acid	lb.	0	5	6	to	0	6	6
Nitronaphthaline	lb.	0	1	6	to	0	1	8
Nitrotoluol	lb.	0	1	3	to	0	1	4
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	2
Orthotoluidine	lb.	0	2	6	to	0	2	9
Orthonitrotoluol	lb.	0	1	3	to	0	1	4
Para-amidophenol, base	lb.	0	12	6	to	0	13	0
Para-amidophenol, hydrochlor	lb	0	13	0	to	0	13	6
Paradichlorbenzol	lb.	0	0	6	to	0	0	8
Paranitraniline	lb.	0	8	0	to	0	8	3
Paranitrophenol	lb.	0	2	9	to	0	3	0
Paranitrotoluol	lb.	0	5	9	to	0	6	0
Paraphenylenediamine, distilled	lb.	0	13	6	to	0	14	6
Paratoluidine	lb.	0	8	6	to	0	9	6
Phthalic anhydride	lb.	0	4	9	to	0	5	0
R. Salt, 100% basis	lb.	0	4	0	to	0	4	2
Resorcin, technical	lb.	0	11	6	to	0	12	6
Resorcin, pure	lb.	0	17	6	to	0	18	0
Salol	lb.	0	5	3	to	0	5	9
Shaeffer acid, 100% basis	lb.	0	3	6	to	0	3	0
Sulphanilic acid, crude	lb.	0	1	8	to	0	1	9
Tolidine, base	lb.	0	10	6	to	0	11	6
Tolidine, mixture	lb.	0	3	0	to	0	3	6

The following prices are furnished by Messrs. Miles, Mole & Co., Ltd., 101, Leadenhall Street, London, E.C.

Metals and Ferro-Alloys

	per	£	s.	d.		£	s.	d.
Aluminium, 98-99%	ton	185	0	0	to	186	0	0
Antimony, English	ton	52	0	0	to	53	0	0
Copper, best selected	ton	106	0	0	to	108	0	0
Ferro Chrome, 6-8%	ton	42	0	0	to	43	0	0
Manganese, loose	ton	37	0	0	to	38	0	0
Silicon, 45-50%	ton	23	0	0	to	24	0	0
Tungsten, 75-80%	lb.	0	3	3	to	0	3	6
Lead Ingot	ton	37	0	0	to	38	0	0
Lead Sheets	ton	48	0	0	to	49	0	0
Nickel, 98-99%	ton	230	0	0	to	231	0	0
Tin	ton	265	0	0	to	266	0	0
Zinc Sheet	ton	78	0	0	to	80	0	0
Spelter	ton	42	0	0	to	43	0	0

Structural Steel

Angles and Tees	ton	25	0	0	to	26	0	0
Flats and rounds	ton	28	0	0	to	29	0	0
Joists	ton	24	0	0	to	25	0	0
Plates	ton	25	0	0	to	26	0	0
Rails, heavy	ton	25	0	0	to	26	0	0
Sheets, 24 Gauge	ton	40	0	0	to	41	0	0
Galvd. Corrd. Sheets	ton	42	0	0	to	43	0	0

Cardiff By-Products Market

October 6.

Sulphate of Ammonia—	
For home consumption (per ton)	£24 d./d.
For export (per ton f.o.b.)	£30 to £40
Benzol, 90's (per gallon)	3s. 5d. to 3s. 10d.
Benzol, 50's (per gallon)	3s. 5d.
Solvent Naphtha (per gallon)	3s. to 3s. 6d.
Heavy Naphtha (per gallon)	3s. 3d. to 3s. 6d.
Crude Naphthalene Salts (per ton)	£16 to £26
Pitch (per ton)	£10 to £11
Creosote (per gallon)	1s. 2d. to 1s. 4d.
Motor Benzol (per gallon)	3s. 5d. to 3s. 10d.
Crude Benzol (per gallon)	2s. 10d. to 3s.
Toluol Benzol (per gallon)	4s.

Alsatian Potash

As large quantities of Alsatian Potash Salts are available at the ports, farmers and manure merchants who have difficulty in obtaining supplies are advised to communicate with the Alsace-Lorraine Development & Trading Co., Ltd., Pinners Hall, Old Broad-street, London, E.C.2. French Kainit (Sylvinite), which is guaranteed 14-16 per cent. pure potash, generally contains 15 per cent., although prices are calculated on a basis of 14 per cent. The other grades obtainable are 20-22 per cent. and 30-32 per cent. French manure salts.

German Potash Sales

THE recently issued report of the German Potash Syndicate states that the sales during the last year totalled 798,700 tons, against 985,400 tons in 1918. Last year's figures showed a decrease of 189,000 tons on those of 1917, and a decrease of no less than 293,000 tons as compared with 1913. The sales distribution is shown in the following table :—

	1913.		1919.
Germany	600,000	...	627,000
Great Britain	29,000	...	10,120
Holland	43,000	...	30,200
Scandinavia and Denmark ...	33,600	...	55,100
United States and Hawaii ...	244,360	...	69,000

The first shipments to Great Britain, the United States and oversea countries began in July, and exports have been steadily increasing since.

Wave Power Tools

The transmission of power by waves through liquids, and the important and definite results obtained, are dealt with in a very descriptive and illustrated booklet issued by W. H. Dorman & Co., Ltd., of Stafford. Economy, convenience, and practicability of these wave power tools are explained, preceded by a personal note by Mr. Walter Haddon, the Chairman of the Company. A short, non-technical description of power transmission by wave action is included, and the system is more fully described from a technical point of view in following pages. Rock drilling is specially dealt with and riveting at 2,400 blows per minute is described.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Bankruptcy Information

COOMBES, R. W., The Nest, 94, Christchurch Road, Bournemouth, and FULLER, W. A., "Eversley," Durley Road, Bournemouth, formerly carrying on business under the style of R. W. Coombes & W. A. Fuller, at "Ormsary," 22, Christchurch Road, Bournemouth, Glass Merchants, September 30.

KEATS, PHILIP PHINEAS, 167, Mary Street, Balsall Heath, Birmingham, Chemist. August 25.

Notice of Intended Dividend

THE TRINIDAD OIL & FUEL CO., LTD., 35, New Broad Street, London. October 15. Liquidator, J. B. Wandless, 13, Old Jewry Chambers, London, E.C.

Companies Winding Up Voluntarily

THE EUREXINE DRUG CO., LTD.—A meeting of creditors will be held at the offices of Messrs. Remington & Massey, 46, Cherry Street, Birmingham, on Tuesday, October 12, at 12 noon. Liquidator, J. Wood Massey.

THE GLOBE GLASS WORKS, LTD. (in voluntary liquidation).—A meeting of creditors will be held at the offices of the liquidator, Capel House, 54, New Broad Street, London, E.C., on Wednesday, October 6, at 3 p.m.

SESTRON COLOUR OXIDISING CO., LTD. (in voluntary liquidation).—A meeting of creditors will be held at 4, Broad Street Place, London, E.C. 2, on Friday, October 15, at 10 a.m. T. D. Jones, Liquidator.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.*]

BLEACHERS ASSOCIATION, LTD., Manchester.—Registered September 21, disposition in security (supplemental to trust deed dated November 21, 1901, securing £2,250,009 debenture stock); charged on property at Paisley. *£2,250,000, £85,000, £70,000, £50,000, £60,000, £120,000 and £50,000. July 6, 1920.

VAUXHALL GLASS MANUFACTURING CO., LTD., London, E.C.—Registered September 21, charge under Land Transfer Acts securing all moneys due, or to become due, to Barclays Bank, Ltd.; charged on Fairoaks, Nightingale Lane, Clapham.

Satisfaction

DUCKTOWN SULPHUR, COPPER & IRON CO., LTD., London, E.C.—Satisfaction registered September 24, £14,400, part of amount registered March 2, 1912.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

POMFRET, Mr., 6, Lancaster Gate, Blackpool, chemist. £15 17s. 5d. June 23.

MORGAN, H. P., & CO., 5, Corridor Chambers, Market Place, Leicester, drysalters. £30 4s. 4d. September 2.

Company News

BELL'S UNITED ASBESTOS.—An interim dividend has been declared on the ordinary shares Nos. 1 to 140,000, and 318,373 to 353,532 (inclusive) of 1s. per share, less tax, and on the new ordinary shares Nos. 200,001 to 318,372 (inclusive) of a proportionate amount, in accordance with the terms of issue as set forth in the circular dated November 26, 1919, being at the rate of 10 per cent. per annum on account of the profits for half-year ended June 30 last.

VAN DEN BERGHS.—The directors advise the ordinary shareholders that although the amount of the liability in respect of excess profits duty, &c., has not yet been settled, they are of opinion that ample provision has been made to meet any possible liability in this respect, and that the balance of the undistributed profits are sufficient to enable the sum of £468,750 to be capitalised. In pursuance of the resolution passed on February 10 last, the board have decided to capitalise this sum of £468,750 by the distribution of three fully-paid 15 per cent. preferred ordinary shares of 5s. each for every ordinary share held on October 13.

H. N. MORRIS & CO., LTD.—The eleventh annual meeting of H. N. Morris & Co., Ltd., chemical and colour manufacturers, Manchester, was held in Manchester on Monday, September 27. The chairman, Mr. H. N. Morris, in moving the adoption of the reports, stated that after writing off depreciation and paying preference dividend at the rate of 6 per cent. per annum for two years, there was a credit balance to carry forward of £4,049. 3s. 11d. Mr. Morris referred to certain developments in the chemical industry in the East in which he was interested and which would necessitate his frequent absence from this country. He had, therefore, decided to relinquish his position as managing director from the end of this year, but would remain a member of the board and consultant to the company. The appointment of Mr. Stanley Smith, who had joined the board during the year, was confirmed, and the retiring directors and auditors were re-elected.

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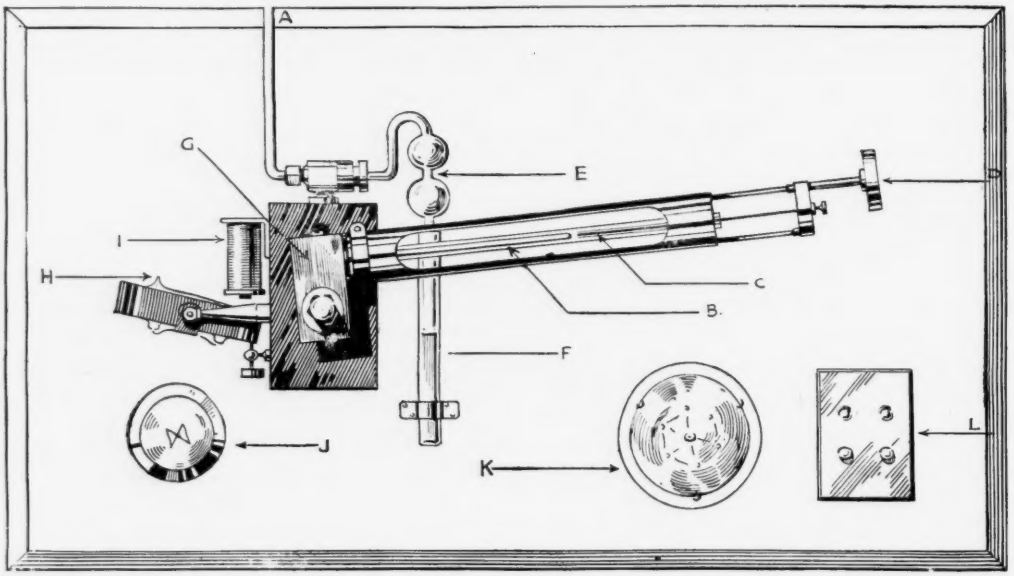
Craven Bank Chambers, BRADFORD. Regd. Office.
Telephone: 850 BRADFORD. Telegrams: "SANDOZ, BRADFORD."
24, Tib Lane, Cross Street, MANCHESTER.
Telephone: MANCHESTER CITY 7737. Telegrams: "XYLENE, MANCHESTER."
AGENTS
LONDON—Skilbeck Bros., 205, Upper Thames St., E.C 4. GLASGOW—Charles Hogg & Co., 9, Royal Exchange Square.
LEICESTER—A. W. Brook, 36, Charles St. BELFAST—Sandoz Chemical Co., Ltd., 47, Queen's Square.
WEST OF ENGLAND—Tom Young, Bath Road, Stonehouse, Glos.



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